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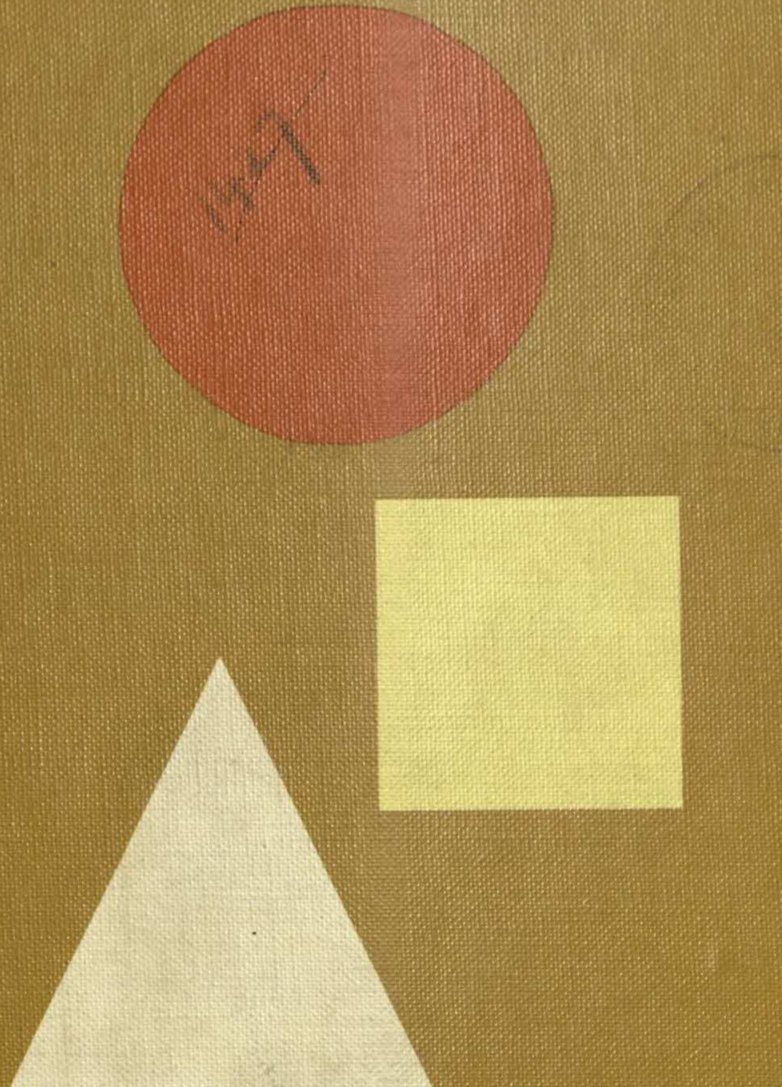

TEACHER'S EDITION — ANNOTATED AND KEYED

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How to Use the TEACHER'S EDITION—Annotated and Keyed

FOR

AMERICAN ARITHMETIC

SECOND EDITION

This Teacher's Edition is designed to be the greatest possible help to the busy teacher. Within one cover, it presents these distinctive features.

1. Pupil's Book. The full text of the pupil's book is printed in black and color exactly as it appears in the book used by the pupil.

2. Annotation. Concise statements of objectives and practical and helpful suggestions to the teacher are overprinted in a distinctive and legible color directly on the pages of the pupil's text.

3. Answers and Keys. Answers to all concrete problems are overprinted in color on the pages of the pupil's text. They are placed in the normal positions or as near to the problem as possible. There is no need for the teacher to work these problems or to turn to an answer section.

The key to the more involved problems with their answers are given in the Teacher's Guide and Key at the end of the book.

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4. Teacher's Guide and Key. For the convenience of the teacher, the Teacher's Guide and Key is printed on tinted paper immediately following the index in the pupil's text. The tinted paper is different enough from the white paper of the pupil's text to assist the teacher in turning easily to guide or key pages. A tint has been used that has been found scientifically easy on the eyes. The pages of the Teacher's Guide and Key are numbered separately with the letter G pointing out that guide and key pages are meant.

The Teacher's Guide and Key provides a full statement of the aims and detailed practical suggestions for each chapter and each page or group of pages in the pupil's text. Following the discussion of the treatment of each page is the key, working the more involved problems in full. References to pages in the workbook AMERICAN WORKSHOP are provided for those teachers using these workbooks. A list of audio-visual aids is provided at the end of the guide.

For advance study in preparation for the class session and for quick reference in the classroom, the Teacher's Edition—Annotated and Keyed offers the teacher all the above in this one volume, very little larger than the pupil's text itself.

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BUILDING INTEREST

American Arithmetic

Second Edition

STATE INSTITUTE OF EDUCATION ★ BANIPUR ★

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AMERICAN BOOK COMPANY

BUILDING INTEREST

American Arithmetic, Second Edition

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TEACHER'S EDITION—Annotated and Keyed

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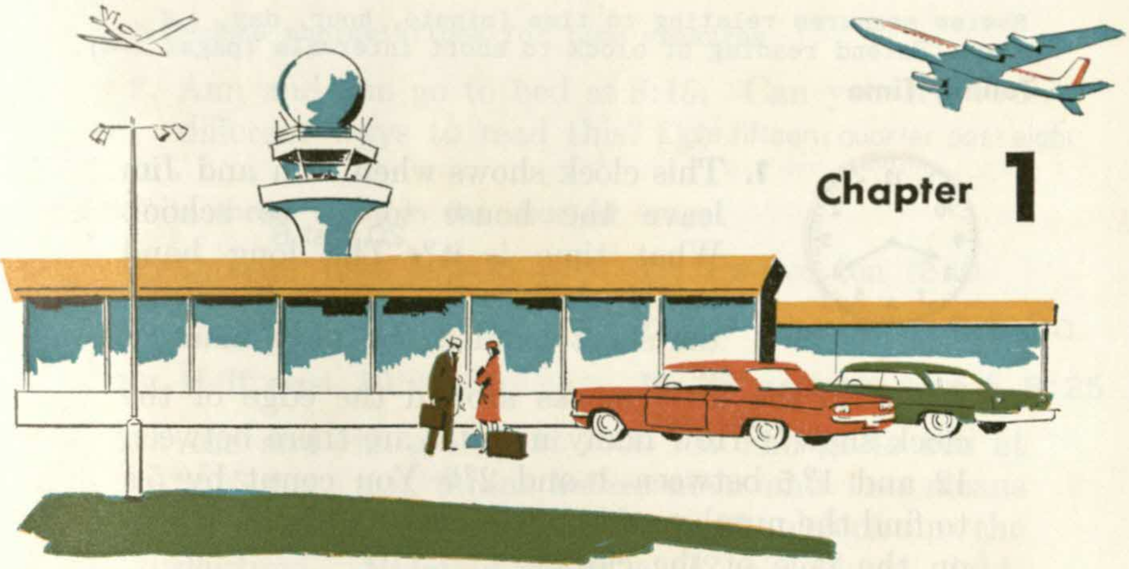
Before beginning the work in this book refer to "Suggestions to Teachers," pages 327-329, and Teacher's Guide and Key, pages 3-7 and 107-109. These sections contain discussion and explanation of number relationships, provision for individual differences, remedial work, and so on, with page references and valuable teaching suggestions.

Reteach and review basic skills in addition, subtraction, multiplication, and division. See Teacher's Guide and Key, page 8, for specific aims of Chapter 1.



Chapter 1

Relate experiences of pupils to arithmetic.
Have pupils make arithmetic scrapbook, in which to keep original problems and projects,

Summer Stories

On the first day of school the children told about the things they had done in the summer. Each child made a problem for the other children to work.

1. Betty said, "I went to the airfield to meet my grandmother. I saw 12 planes on the ground and 3 in the air. How many planes did I see?" 15*

2. Jack said, "I helped a man sell balloons at the circus. I sold 75 balloons the first day. The next day I sold 90. How many balloons did I sell?" 165

3. Ann made this problem: "My grandfather lives on a farm. He has 30 hens, 12 ducks, and 25 turkeys. I fed them. How many were there in all?" 67

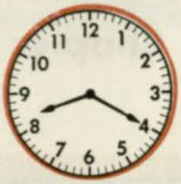
4. Joe said, "I camped by a lake. One week I caught 19 fish. I had to throw 6 small fish back into the lake. How many fish were large enough to keep?" 13

5. Think of something you did last summer that used numbers. Then try to make a problem about it.

*For convenience here, only numerical part of answer is given. Pupils should give complete answer and process steps, as shown in Teacher's Guide and Key for each page. This procedure is used throughout the text.

Review measures relating to time (minute, hour, day, A.M., P.M.). Extend reading of clock to short intervals (pages 2-4).

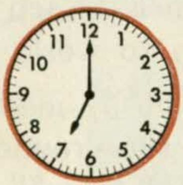
Telling Time



1. This clock shows when Ann and Jim leave the house to go to school. What time is it? 20 past 8 The long hand on the clock is the **minute hand** and the short hand is the **hour hand.**

2. What do the little marks around the edge of the clock show? Minutes How many minutes are there between 12 and 1? 5 between 1 and 2? 5 You count by 5's to find the number of minutes between the numbers on the face of the clock.

3. How many minutes does it take the long hand to go all the way around the face of the clock? 60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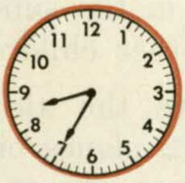
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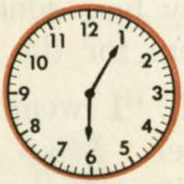
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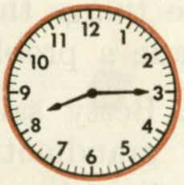
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4. The first clock shows when Ann and Jim get up. The second clock shows when they get to school. The third clock shows when they look at Cowboy Jim on television. The fourth clock shows when they go to bed. Tell the time each clock shows. (1) 7 o'clock; (2) 35 minutes past 8; (3) 5 minutes past 6; (4) 15 minutes past 8

5. How many minutes does it take the long hand to go from 8 o'clock to 9 o'clock? 60 How many hours does it take the short hand to go from 8 to 9? 1

6. Look at the second clock above. It says that Ann and Jim get to school at 35 minutes past 8. A short way to write 35 minutes past 8 is 8:35. You read it "eight thirty-five."

Review and give pupils opportunity to show half and quarter hour (use cardboard clock face). Then demonstrate 5-minute and 1-minute positions. Have pupils make time schedules of own or school activities to read to class.

Introduce abbreviations for time measures.

7. Ann and Jim go to bed at 8:15. Can you tell two different ways to read this? Eight fifteen; quarter past eight

Write these times in the shortest way:

8. Quarter past 5 5:15
9. Quarter of 12 11:45
10. Half past 10 10:30
11. Twelve ten 12:10
12. 20 minutes to 7 6:40
13. 25 minutes past 8 8:25

14. Ann and Jim get up at 7:00 A.M. and go to bed at 8:15 P.M. A.M. means **before noon** and P.M. means **after noon. Noon** comes at 12 o'clock in the daytime. **Midnight** comes at 12 o'clock at night.

15. How many hours are there from noon to midnight? 12 How many hours are there from midnight to noon of the next day? 12 How many hours are there in 1 whole day? 24

16. Learn this table of time:

Emphasize.

60 minutes (min.) = 1 hour (hr.)
24 hours (hr.) = 1 day (da.)

17. A short way to write minute or minutes is **min.** What is a short way to write hour? hr. A short way of writing a word is called an **abbreviation.**

Write these with figures and abbreviations:

18. seven days 7 da. ten minutes 10 min. three hours 3 hr.
19. nine hours 9 hr. one half hour $\frac{1}{2}$ hr. five days 5 da.
20. eight days 8 da. four minutes 4 min. eight hours 8 hr.

In ex. 8–13 have pupils use clock face or draw clock faces to show times. Demonstrate ex. 15 on large clock face. Ask pupils how we know times of television programs. Begin collection of printed TV or radio program schedules.

Telling Time

Use a toy clock or draw clocks on the blackboard to show these times:

1. Two forty

2. Six twenty

3. Ten ten

4. Quarter of 6

5. Half past 11

6. 5 minutes to 8

7. 8:30

8. 9:00

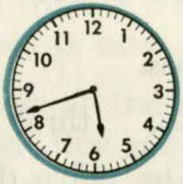
9. 7:45

10. Bill used a train timetable when he went to camp last summer. His train was to leave at 9:18. Bill looked at his watch just before the train started. The long hand pointed to 3. Bill said, "Now it is 9:15." When the long hand pointed to the next little mark, Bill said, "It is 9:16." Soon it was 9:17. When the train started, the hands of Bill's watch were pointing to 9:18.

11. Bill's train left 18 min. after 9 o'clock. To tell time to the minute, count the time by 5's to the number just before the minute hand. Say "5, 10., 15." Then count the little marks by 1's until you come to the mark toward which the minute hand points. What is the time on Bill's watch in ex. 10? 9:18 (Ex. means exercise.)

12. Tell the time shown on these clocks:

5:42



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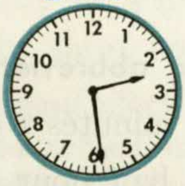

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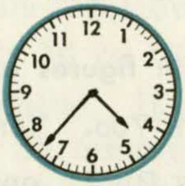

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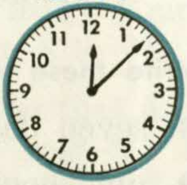


To the Teacher. Caution pupils never to write in their books to fill in blank spaces.

If possible, provide all pupils with plane, bus, or train timetables. Have pupils show various times on these on clock face. Give ample practice in reading these timetables and writing or showing times listed.

Reteach meaning of, and vocabulary and signs for, addition.
Begin arithmetic vocabulary chart.

Reviewing Addition Facts

1. When you say that 8¢ and 7¢ are 15¢, you are **adding.** You **add** 8 and 7 to get 15. 15 is called the **sum.** You can also write it like this: $8 + 7 = 15$.

$$\begin{array}{r} 8 \\ +7 \\ \hline 15 \end{array}$$

+ means **and** or **plus**

= means **are** or **equals**

$8 + 7 = 15$ is called an **addition fact.**

2. Susan had 8¢. She found 5¢ on the sidewalk. How many cents did she have all together? 13¢ How many are 8¢ and 5¢? 13¢ How many are 8 and 5? 13

Demonstrate and stress.

You use addition when you put together two or more groups of the same things.

3. Look at the apples above. How many apples are 4 apples and 3 apples? 7 How many apples are 3 apples and 4 apples? 7 4 + 3 = . 7 . 3 + 4 = . 7 .

Draw pictures if you need help to find the sums: Use flash cards for more practice

4. 6 + 3 9 8 + 4 12 9 + 2 11 1 + 7 8 4 + 4 8

5. 4 + 7 11 3 + 9 12 2 + 8 10 5 + 5 10 6 + 8 14

6. 5 + 8 13 6 + 7 13 9 + 7 16 8 + 9 17 4 + 9 13

See page 328 of text, "Supplementary Exercises," for use of "More Practices" pages.

More Practice. See ① on page 313.

Review and show (use books, discs, pupils) that addition means to combine two or more groups of same things. Discuss ex. 1 and put terms, signs, illustrations on class chart. Have pupils show ex. 5-6 in vertical form.

Helps in Addition Problems

Reteach addition thought patterns.

1. In the park 5 girls and 4 boys were playing a game. How many children in all were playing a game? 9
2. Bill has 9¢ in his pocket. He also has 8¢ in his hand. How many cents has Bill all together? 17¢
3. Jack had 9 hens. His father gave him 4 more hens. How many hens did Jack have then? 13
4. Ann picked 8 flowers and Susan picked 7 flowers. How many flowers did both girls pick? 15
5. Joe spent 5¢ for a candy bar. Then he spent 8¢ for a stick of candy. How much did Joe spend? 13¢
6. Patty had 5 dolls. She got 2 dolls for Christmas. How many dolls has Patty now? 7
7. Bill sold 7 tickets yesterday and 5 tickets today. 12 How many tickets did Bill sell in two days?

In some of the problems above there are words like **in all, all together**, and **both.** These words help you to know that you must add to find the answer. Can you find these problems?

8. Make up an addition problem about birds that uses the words **all together.**
9. Make up an addition problem using the word **both.**

Observe pupils as they do ex. 1-7 to see how they "attack" problems. Then discuss them with pupils, asking them to pick out key words or phrases. Begin class chart showing thought pattern, process, illustrated problems.

Review 100 basic addition facts through diagnostic test.

Test on the Addition Facts

Add. Try to give the right answers quickly:

1.	7 2 9	8 9 17	5 4 9	7 5 12	4 8 12	0 3 3	6 2 8	9 1 10	7 4 11	5 6 11
2.	2 6 8	4 4 8	0 9 9	3 6 9	2 1 3	8 2 10	1 8 9	2 3 5	6 0 6	3 4 7
3.	5 9 14	9 4 13	3 1 4	1 9 10	9 3 12	7 6 13	3 0 3	0 2 2	7 8 15	5 7 12
4.	8 3 11	3 9 12	1 0 1	5 0 5	9 9 18	4 1 5	6 7 13	7 7 14	0 0 0	4 6 10
5.	6 3 9	5 5 10	8 7 15	2 2 4	8 0 8	3 8 11	1 1 2	2 4 6	1 7 8	0 1 1
6.	1 2 3	2 7 9	6 1 7	9 5 14	3 5 8	0 8 8	4 9 13	8 6 14	2 8 10	9 2 11
7.	8 5 13	0 5 5	3 2 5	1 4 5	4 0 4	7 9 16	5 3 8	9 0 9	9 7 16	5 2 7
8.	3 3 6	0 7 7	5 8 13	4 2 6	9 6 15	2 0 2	6 8 14	2 5 7	8 4 12	4 5 9
9.	8 8 16	4 3 7	6 4 10	6 6 12	1 3 4	7 3 10	9 8 17	5 1 6	7 1 8	0 6 6
10.	4 7 11	1 6 7	6 9 15	7 0 7	1 5 6	6 5 11	8 1 9	0 4 4	2 9 11	3 7 10

To the Teacher. This page is to be used as a diagnostic test and results are best when it is administered orally to each pupil. These facts should be mastered so thoroughly that the pupil can give all the answers quickly and accurately. See page 328 also.

Use of flash cards is helpful in giving this test. Note errors or hesitancy on pupils' progress cards. Have pupils make small flash cards for own use in further study.

Teach relationships which exist between some addition facts: commutative principle, zero facts, doubles, near doubles, adding 9, adding 8.

How to Help Yourself

This page will show you some ways to help yourself if you forget the answer to an addition fact.

1. How many are 8 shells and 3 shells? 11
How many are 3 shells and 8 shells? 11
You see that both the sums are the same, 11 shells.

2. The addition facts 8 + 3 and 3 + 8 make a **pair of facts.** The numbers in 8 + 3 are just like those in 3 + 8 but they are reversed. **If two numbers are reversed, their sum is the same.** This is called the commutative principle for addition. Emphasize.

$$\begin{array}{r}8\\+3\\\hline 11\end{array}\qquad\begin{array}{r}3\\+8\\\hline 11\end{array}$$

3. Suppose you do not remember the answer to 5 + 7. Reverse the numbers and you get 7 + 5. How many are 7 + 5? 12 Then how many are 5 + 7? 12

4. It is easy to tell the answers to facts in which 1 is added to a number. You are really counting by 1's. How many are 6 + 1? 7 1 + 8? 9 7 + 1? 8 9 + 1? 10

5. The zero facts are easy to learn. How many are 8 shells and 0 shells? 8 How many are 5 + 0? 5 0 + 9? 9 **If you add a number and zero, the sum is the same as that number.** For this reason, 0 is called the identity element of addition.

6. The **doubles** are the facts in which both numbers are alike. The facts below are the doubles. Look at the sums; they go by 2's:

$$\begin{array}{r}1\\1\\\hline 2\end{array}\quad\begin{array}{r}2\\2\\\hline 4\end{array}\quad\begin{array}{r}3\\3\\\hline 6\end{array}\quad\begin{array}{r}4\\4\\\hline 8\end{array}\quad\begin{array}{r}5\\5\\\hline 10\end{array}\quad\begin{array}{r}6\\6\\\hline 12\end{array}\quad\begin{array}{r}7\\7\\\hline 14\end{array}\quad\begin{array}{r}8\\8\\\hline 16\end{array}\quad\begin{array}{r}9\\9\\\hline 18\end{array}$$

Lead pupils to realize that there is always a way to work out answer to addition fact. Demonstrate relationships with objects first. See Guide pages 107-109 for suggestion for reteaching facts, using these relationships.

The associative (or grouping) principle for addition is applied in ex. 10, 12.

7. The doubles help you to learn other facts called the **near doubles.** If you know that 3 + 3 = 6, you can tell that 3 + 4 is 1 more than 6, or 7. Also, if you know that 5 + 5 = 10, you can tell that 5 + 6 = 11.

8. What other facts can you make if you know that 6 + 6 = 12? if you know that 7 + 7 = 14? if you know that 8 + 8 = 16? See G-11.

9. How many are 7 and 8? 15 6 and 7? 13 8 and 9? 17

10. It is easy to add 9 to a number. For example, to add 9 and 6, take 1 from 6 and add it to 9. You now have 10 + 5, or 15. So 9 + 6 is the same as 10 + 5, or 15. Show that 9 + 4 is the same as 10 + . . . 3, or . . . 13 See G-11.

11. How many are 9 + 7? 16 9 + 5? 14 9 + 3? 12 9 + 4? 13

12. To add 8 to a number is easy also. For example, to add 8 and 5, take 2 from 5 and add it to 8. You now have 10 + 3, or 13. So 8 + 5 is the same as 10 + 3, or 13.

13. How many are 8 + 6? 14 8 + 4? 12 8 + 3? 11 8 + 7? 15

14. The answers to 7 + 4 and 4 + 7 are found like this: You have learned that 7 + 3 = 10. So 7 + 4 = 11. 7 + 4 = 11 tells you that 4 + 7 = 11.

15. The answers to 7 + 5 and 5 + 7 are found like this: You know that 7 + 4 = 11, so 7 + 5 = 12. This tells you that 5 + 7 = 12 also.

16. If you do not know the answer to an addition fact, try to get help from a fact you do know. If you know all the facts, arithmetic will be easy for you.

Give practice on addition facts, with sums of 11 or more.

Oral Practice

What numbers should be put in the spaces?

1. 7 and 7 are ...14, so 7 and 8 are ...15

2. 8 and 8 are ...16, so 8 and 9 are ...17

3. 9 and 5 are the same as 10 and ...4, or ...14

4. 9 and 7 are the same as 10 and ...6, or ...16

5. 7 and 3 are ...10, so 7 and 4 are ...11

6. 8 and 9 are ...17, so 9 and 8 are ...17

7. 6 and 6 are ...12, so 6 and 7 are ...13

8. 8 and 4 are the same as 10 and ...2, or ...12

9. 8 and 6 are the same as 10 and ...4, or ...14

10. 9 and 6 are the same as 10 and ...5, or ...15

11. 7 and 6 are ...13, so 6 and 7 are ...13

12. 5 and 9 are the same as ...4 and 10, or ...14

13. 3 and 8 are the same as ...1 and 10, or ...11

Give the sums:

14. 9 + 9 18 8 + 7 15 4 + 8 12 7 + 7 14 3 + 8 11

15. 7 + 4 11 6 + 7 13 9 + 8 17 8 + 6 14 9 + 7 16

16. 6 + 9 15 5 + 8 13 4 + 9 13 9 + 5 14 7 + 8 15

17. 5 + 6 11 8 + 8 16 8 + 3 11 7 + 5 12 8 + 5 13

18. 9 + 4 13 5 + 7 12 7 + 9 16 8 + 4 12 9 + 3 12

19. 6 + 8 14 5 + 9 14 3 + 9 12 9 + 6 15 4 + 6 10

20. 8 + 9 17 7 + 6 13 6 + 6 12 4 + 7 11 9 + 2 11

Urge pupils to respond quickly. Note pupils who hesitate, and have them use flash cards with partners. Pupils who have mastered facts might like to work at the arithmetic corner. Supply arithmetic puzzles, games, and so on.

Reteach single-column addition without carrying. The associative principle for addition is illustrated in column addition and in the check.

1. How many are 6 days plus 4 days? 10 days

2. Find the sum of 4¢, 5¢, and 3¢. 12¢

3. Bob paid $3 for a cowboy hat and $1 for a tie. How many dollars did Bob spend? $4

4. Mary has picked 3 yellow flowers, 4 blue flowers, and 5 white flowers. How many flowers has she picked in all? 12

Find these sums. Begin at the bottom and add up. Check the work by adding down: Stress.

5.	4	5	7	2	6	8	5	4	2
	3	3	2	5	3	1	4	4	7
	2	6	5	3	6	7	4	3	2
	9	14	14	10	15	16	13	11	11
6.	3	6	7	5	6	4	5	6	4
	4	1	2	1	3	3	2	3	2
	3	4	6	7	5	6	5	4	7
	10	11	15	13	14	13	12	13	13
7.	3	4	2	5	3	2	3	6	3
	4	1	2	2	6	4	3	1	0
	2	4	2	1	0	1	3	4	5
	1	2	2	4	2	3	3	0	4
	10	11	8	12	11	10	12	11	12

Find these sums: Do orally to develop mental arithmetic ability.

8.	6 + 1 + 3 10	7 + 2 + 3 12	4 + 2 + 6 12
9.	4 + 4 + 4 12	8 + 1 + 6 15	5 + 3 + 4 12
10.	5 + 3 + 2 10	6 + 3 + 0 9	8 + 1 + 4 13
11.	6 + 2 + 6 14	2 + 6 + 3 11	5 + 3 + 3 11

Have pupils do some examples orally to check thinking process, for example, in ex. 5 they should think, or say, "2, 5, 9." If "unseen number," 5, causes difficulty, let them use objects to visualize process.

Reteach meaning of, and vocabulary and sign for, subtraction.

Reviewing Subtraction Facts

1. When you take 7 from 16 and find that 9 is left, you are **subtracting.** You write it as shown at the right. You can also write it like this: 16 − 7 = 9. The sign − is called the **minus** sign. It means **take away** or **subtract.** 16 − 7 = 9 is a **subtraction fact.**

$$\begin{array}{r}16\\-7\\\hline 9\end{array}$$

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

2. You see 12 stars in a row. Put your hand over 4 stars. How many stars are left? 8
4 stars from 12 stars leaves how many stars? 8

$$\begin{array}{r}12\\-4\\\hline\end{array}$$

3. Look at the stars again. Put your hand over 9 stars. How many stars are left? 3
9 stars from 12 stars leaves how many stars? 3
9 from 12 is how many? 3

$$\begin{array}{r}12\\-9\\\hline\end{array}$$

Draw stars if you need help to find the answers: In ex. 4–5, use horizontal form also.

4.
$$\begin{array}{r}9\\-4\\\hline 5\end{array}\qquad\begin{array}{r}7\\-2\\\hline 5\end{array}\qquad\begin{array}{r}16\\-8\\\hline 8\end{array}\qquad\begin{array}{r}11\\-2\\\hline 9\end{array}\qquad\begin{array}{r}15\\-7\\\hline 8\end{array}\qquad\begin{array}{r}17\\-9\\\hline 8\end{array}\qquad\begin{array}{r}14\\-6\\\hline 8\end{array}$$

5.
$$\begin{array}{r}8\\-5\\\hline 3\end{array}\qquad\begin{array}{r}5\\-1\\\hline 4\end{array}\qquad\begin{array}{r}18\\-9\\\hline 9\end{array}\qquad\begin{array}{r}13\\-6\\\hline 7\end{array}\qquad\begin{array}{r}15\\-9\\\hline 6\end{array}\qquad\begin{array}{r}11\\-4\\\hline 7\end{array}\qquad\begin{array}{r}16\\-9\\\hline 7\end{array}$$

6. 15 − 6 = 9 14 − 7 = 7 13 − 9 = 4 11 − 5 = 6

Demonstrate and stress.

To find how many are left, you subtract.

More Practice. See ② on page 313. Use for hesitancy.

Review and show (use materials) that we subtract to find how many are left. Discuss terms and sign in ex. 1; add to vocabulary chart. In ex. 4–6 ask pupils what is being taken away, or subtracted.

Review 100 basic subtraction facts through diagnostic test.

Test on the Subtraction Facts

Subtract. Try to give the right answers quickly:

1.	9 8 1	4 4 0	7 4 3	9 5 4	8 0 8	13 9 4	11 5 6	14 9 5	11 2 9	12 8 4
2.	4 1 3	9 2 7	8 8 0	1 0 1	7 5 2	10 9 1	16 7 9	11 6 5	13 7 6	14 5 9
3.	2 1 1	7 0 7	2 2 0	8 7 1	7 1 6	9 0 9	12 9 3	13 5 8	11 3 8	14 8 6
4.	6 2 4	4 0 4	9 9 0	6 5 1	3 2 1	5 3 2	10 1 9	12 6 6	10 5 5	10 3 7
5.	8 4 4	9 6 3	6 3 3	5 5 0	7 3 4	8 2 6	10 6 4	12 7 5	11 7 4	13 8 5
6.	7 6 1	2 0 2	5 2 3	7 7 0	8 1 7	9 3 6	17 8 9	12 3 9	15 7 8	16 9 7
7.	5 0 5	8 3 5	6 1 5	8 6 2	4 2 2	3 0 3	10 4 6	14 7 7	10 2 8	10 7 3
8.	3 3 0	6 4 2	4 3 1	8 5 3	9 7 2	14 6 8	17 9 8	11 9 2	12 5 7	15 8 7
9.	7 2 5	6 6 0	5 1 4	9 1 8	0 0 0	13 6 7	11 4 7	18 9 9	15 6 9	11 8 3
10.	3 1 2	9 4 5	6 0 6	5 4 1	1 1 0	13 4 9	10 8 2	16 8 8	12 4 8	15 9 6

To the Teacher. This page is to be used as a diagnostic test. See the suggestions for the test on the addition facts on page 7. Some teachers prefer to make tests on the basic facts by means of flash cards, each card containing one fact. See page 328 also.

Be sure to note errors or hesitancy on pupils' progress cards. Have them make own flash cards for further study.

Review 6 problem patterns in subtraction; see G-12.

Helps in Subtraction Problems

1. Joe picked 14 apples. He gave his mother 9 of them. How many apples did Joe have left? 5
2. Ann bought paper for 8¢. She gave the man 10¢. How much change did Ann get? 2¢

Suppose you know the number of things there were at first. You also know the number of things taken away. To find how many are left, you subtract.

3. Mother put 12 cookies on a plate. After lunch there were only 3 left. How many cookies did we eat? 9
4. This morning Jack had 15 tickets to sell. Now he has 7 tickets left. How many tickets did he sell? 8

Suppose you know the number of things there were at first. You also know the number of things left. To find how many things are gone, you subtract.

5. Peggy will make 14 Christmas cards. She has made 6 of them. How many more must she make? 8

Suppose you know the number of things needed. You also know how many there are now. To find how many more are needed, you subtract.

Some pupils may need more sample problems to reinforce recognition of patterns. Let brighter pupils make up problems for arithmetic corner, while you work with others.

6. At Mary's party there were 14 children. 8 of them were girls. How many boys were at the party? 6

7. Dick has 11 hens. There are 5 white hens. The rest are brown. How many brown hens has Dick? 6

Suppose you know the whole number and one of its parts. To find the other part of the number, you subtract.

8. John is 12 years old. His brother is 8 years old. How much older is John than his brother? 4 years

9. Peggy has saved \$11. Bob has saved \$9. How much less has Bob saved than Peggy? \$2

10. Fred has 13 rabbits. Peter has only 6 rabbits. How many more rabbits has Fred than Peter? 7

11. Betty is 54 inches tall. Ann is 60 inches tall. How much taller is Ann than Betty? 6 inches

To find how much more or less one number is than another, you subtract.

12. Tom bought 6 stamps. He used all 6 of his stamps. How many stamps does Tom have left? 0 stamps

If you take away all of a group, the answer is zero. If you subtract zero from a group, the answer is the same as the group.

Add patterns to class chart (page 6). Let pupils make up, illustrate, and show in numerical form, own problems demonstrating patterns. Put in scrapbooks.

Help in remembering subtraction facts is based on idea that subraction "undoes" addition, i.e., it is the inverse operation of addition.

Addition Helps Subtraction

1. How many dots are green?3 How many dots are yellow?5 How many are 3 dots and 5 dots? 8 dots Cover up 3 green dots. How many dots are left?5 How many are 3 dots from 8 dots? 5 dots How many are 3 from 8?5

2. Look at the dots again. Now cover up 5 yellow dots. How many dots are left?3 How many are 5 dots from 8 dots?3 How many are 5 from 8?3

3. You know that $3 + 5 = 8$. This shows you that $8 - 3 = 5$ and that $8 - 5 = 3$. $3 + 5 = 8$ is an addition fact. $8 - 3 = 5$ and $8 - 5 = 3$ are both subtraction facts. The addition facts help you to make the subtraction facts.

4. How many pencils are red?4 How many pencils are blue?5 How many are 4 pencils and 5 pencils?9 pencils

5. 4 and 5 are .9., so 4 from 9 is .5..

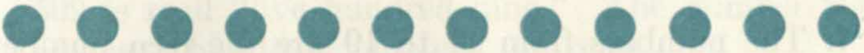
6. On paper draw 15 dots. Make 6 dots green. 6 dots and .9. dots are 15 dots. Cover up 6 green dots. How many dots are left?9 How many are 6 from 15? 9 How many are 9 from 15?6

7. 6 and 9 are .15., so 6 from 15 is .9..

8. $9 + 6 =$ 15 $\quad 6 + 9 =$ 15 $\quad 15 - 9 =$ 6 $\quad 15 - 6 =$ 9

Let pupils use objects in ex. 1-5 to show that same numbers are used in related facts, but in addition groups are put together, in subtraction they are taken away. Have pupils write other fact families as in ex. 8.

What to Do If You Forget



1. Mary does not remember what 7 from 12 equals. So she thinks, "7 and .5. are 12." Then she knows that 7 from 12 is .5. Look at the 12 dots above if you need help for 7 and .5. are 12.

$$\begin{array}{r} 12 \\ -7 \\ \hline \end{array}$$

2. Fred does not remember what 4 from 12 equals. So he looks at the 12 dots and says, "4 and .8. are 12." He then knows that 12 − 4 = .8.

$$\begin{array}{r} 12 \\ -4 \\ \hline \end{array}$$

Draw dots to help you find any answers you do not know:

3. 8 and .6. are 14, so 8 from 14 is .6.
4. 7 and .9. are 16, so 7 from 16 is .9.
5. 5 and .8. are 13, so 5 from 13 is .8.
6. 8 and .8. are 16, so 8 from 16 is .8.
7. 6 and .7. are 13, so 6 from 13 is .7.
8. 9 and .5. are 14, so 9 from 14 is .5.
9. 3 and .8. are 11, so 3 from 11 is .8.
10. Jack wants to sell 12 pumpkins. He has sold 8 of them. How many more pumpkins must he sell? 4

11. Ann needs 18 stamps to fill a page in her book. She has 9 stamps on the page now. How many more stamps does she need to fill that page? 9
12. Betty wants \$5 to buy play shoes. She has \$3 now. How many more dollars does Betty need? \$2

Teach pupils how to express combinations, as shown in ex. 1–2, in additive form. Have pupils begin with lower number and ask, "7 and what are 12?" Follow same procedure for other combinations.

Reteach tens nature of number system and place value through thousands (pages 18–20). See G-13 for prelesson review.

The Meaning of Numbers

1. The numbers from 11 to 19 are the **teen** numbers. Write them on the blackboard.

2. Here are the number names of the **teen** numbers:

eleven	fourteen	seventeen
twelve	fifteen	eighteen
thirteen	sixteen	nineteen

3. The number 15 has two places, or two figures. It is a **two-place,** or a **two-figure,** number. It means 1 ten and 5 ones. The number 20 means 2 tens and no ones. The number 62 means 6 tens and 2 ones. What does the number 26 mean? 2 tens and 6 ones When 6 is at the left in a two-place number, it means 6 tens. When 6 is at the right, it means 6 ones.

Tens	Ones
1	5
2	0
6	2

4. What does 47 mean? 4 tens and 7 ones What does 60 mean? 6 tens and no ones

5. Count by 10's to 100. Here are the number names of the tens: Use a hundred chart for this counting.

twenty	fifty	eighty
thirty	sixty	ninety
forty	seventy	one hundred

Write these numbers in figures; tell what each one means:

6. eighty-seven 87, 8 tens and 7 ones fifty-six 56, 5 tens and 6 ones fourteen 14, 1 ten and 4 ones

7. thirty-eight 38, 3 tens and 8 ones ninety-two 92, 9 tens and 2 ones sixteen 16, 1 ten and 6 ones

8. Count by 5's from 100 to 135. 100, 105, 110, 115, 120, 125, 130, 135 Each number has 3 figures. They are all **three-place** numbers. The new place at the left is **hundreds** place. Tell what 135 means. 1 hundred, 3 tens, 5 ones

Hundreds	Tens	Ones
1	3	5

Provide pupils with counters (paste sticks, paper strips of ten squares, and single squares) to use to show 2-place numbers in ex. 2–7. Let them use place pocket chart also. In ex. 8, ask pupils how many hundreds, tens, ones there are in "entire" number (1 hundred, 13 tens not 3, 135 ones not 5).

Use vertical abacus in teaching thousands (ex. 18-20).

9. The number 509 means 5 hundreds, no tens, 9 ones. 509 is read "five hundred nine." The number 800 means 8 hundreds, no tens, no ones.

10. Read each number and tell what it means: See G-14.
645 356 999 200 164 527

Write these numbers in figures: Show on place-value diagram as in ex. 8, page 18.

11. eight hundred twelve 812 four hundred fifteen 415

12. five hundred forty 540 six hundred fifty-eight 658

13. nine hundred seven 907 two hundred eighty-four 284

14. Write the smallest two-place number. 10 Write the largest two-place number. 99

15. Write the smallest three-place number. 100 Write the largest three-place number. 999

16. Write the smallest number you can with the figures 3, 7, and 4. 347 Use these figures again to write the largest number you can. 743

17. Count by 100's like this: 100, 200, 300, 400 . . ., 500 . . ., 600 . . ., 700 . . ., 800 . . ., 900 . . ., 1000 . . .

18. The last number in ex. 17 is **ten hundred** or **one thousand.** Ten hundreds are the same as one thousand. You write it like this: 1000. This is a **four-place** number. The place at the left of hundreds place is **thousands** place.

19. Count by 100's above 1000 like this: 1100, 1200, 1300, and so on. You read 1100 like this: **one thousand one hundred** or **eleven hundred.**

20. Read these numbers in two ways: 1400, 1900, 1600, 1800, 1500, 1300, 1700, 1200. See G-14.

Have pupils show 3-place numbers with materials and on pocket chart. In ex. 9-16, question pupils as in ex. 8 on page 18. Use vertical abacus to demonstrate numbers in ex. 18-20.

The Meaning of Numbers

1. Dick read that there are 1685 children in the schools of Georgetown. He said that 1685 means 1 thousand, 6 hundreds, 8 tens, and 5 ones. Ann said 1685 can be made like this: 1000 + 600 + 80 + 5.

Thousands	Hundreds	Tens	Ones
1	6	8	5

2. You read 1685 like this: **one thousand six hundred eighty-five** or **sixteen hundred eighty-five.**

3. When a number like 1957 stands for the year, you read it **nineteen fifty-seven.**

4. Read these numbers in two ways. Then tell what each one means: 1842, 1600, 1703, 1947, 1492. See G-14.

5. Count by 1000's like this: 1000, 2000, 3000, 4000 . . ., 5000 . . ., 6000 . . ., 7000 . . ., 8000 . . ., 9000 . . .

6. The number 6207 is a four-place number. It means 6 thousands, 2 hundreds, 0 tens, 7 ones. It is read like this: **six thousand two hundred seven** or **sixty-two hundred seven.** Sometimes a four-place number, such as a telephone number, is read like this: **six, two, o, seven.** When there is a zero in the number, it is read like the letter o.

7. Read these numbers in two ways: 6458, 3207, 4700, 1960, 1875, 1958. See G-14.

8. What is the smallest four-place number? 1000

9. What is the largest four-place number? 9999

10. Study the four numbers at the right. Then tell what the 2 means in each of the four numbers. Tell what the 4 means in each number. Do the same with 1 and 5.

Thousands	Hundreds	Tens	Ones
2	1	4	5
5	2	1	4
1	4	5	2
4	5	2	1

Let pupils use abacus to demonstrate various 4-place numbers. Let different pupils show a number, while class writes it on place-value diagram. Stress that value of each figure depends on place it occupies.

Reteach column addition with no carrying or adding by endings.

Adding Larger Numbers

1. **Problem** Yesterday Joe and Bill put 73 music books and 55 story books on the shelves. How many books was that all together? 128

Explanation Write the numbers as shown at the right and add. Begin at the bottom and add up.

$$\begin{array}{r} 73 \\ \underline{55} \\ 128 \end{array}$$

Think, "5 + 3 = 8." Write 8 in ones place. Think, "5 + 7 = 12." Write 2 in tens place and 1 in hundreds place. The answer is 128. There were 128 books all together.

Check the work by adding the numbers again. Begin at the top and add down. The sum is 128 again, so call the answer right.

2. **Problem** Today 324 children from Bill's school and 450 from Hill School saw a movie. How many children were there? 774

Explanation Add as shown at the right.

$$\begin{array}{r} 324 \\ \underline{450} \\ 774 \end{array}$$

Think, "0 + 4 = 4." Write 4 in ones place. Think, "5 + 2 = 7." Write 7 in tens place. Think, "4 + 3 = 7." Write 7 in hundreds place. There were 774 children. Check the work.

Add these numbers and check: Be sure pupils reverse direction to check.

3.	33	43	70	54	175	225	363
	23	26	69	85	614	321	435
	56	69	139	139	789	546	798
4.	14	61	50	41	424	171	422
	13	58	25	93	274	402	145
	27	119	75	134	698	573	567

More Practice. See ③ on page 314.

In ex. 1, be sure pupils understand that 12 tens is same as 1 hundred and 2 tens. Stress fact that ones are added to ones, tens to tens, and so on. Be sure basic facts are not causing difficulty.

Date..........
Acc. No. 13367, 16.5.2008

Reteach adding by endings with and without bridging. Make adding-by-endings cards for further practice.

Adding by Endings

2	12	22	32	42	52	62
6	6	6	6	6	6	6
8	18	28	38	48	58	68

1. You know that 2 and 6 are 8. If you look at all the other examples above, you see that 2 and 6 are to be added in each example. 12 and 6 are 18. How many are 22 and 6? 28

2. Tell the answers to the other examples above.

Give the sums:

3. 5 + 4 9 15 + 4 19 25 + 4 29 35 + 4 39 45 + 4 49

4. 3 + 5 8 13 + 5 18 43 + 5 48 83 + 5 88 93 + 5 98

7	17	27	37	47	57	77
8	8	8	8	8	8	8
15	25	35	45	55	65	85

5. All the sums above end in 5 because the sum of 7 and 8, which is 15, ends in 5. The tens figure of each sum is 1 more than the tens figure of the 2-place number because 7 + 8 is more than 9.

This addition should be one mental operation. Have pupils explain sums, as in ex. 5, to check this.

Give the sums:

6. 6 + 8 14 16 + 8 24 26 + 8 34 76 + 8 84 86 + 8 94

7. 9 + 4 13 49 + 4 53 69 + 4 73 89 + 4 93 99 + 4 103

8. 6 + 7 13 36 + 7 43 76 + 7 83 86 + 7 93 96 + 7 103

9. Add 7 to each of these numbers: 32, 39 59, 66 66, 73 84. 91

More Practice. See ④ on page 314. Use to increase speed.

Through questions, lead pupils to see that end figures are same (from basic fact) and tens figures are same as original, in facts above ex. 1. Follow similar procedure in discovering generalization in ex. 5.

Reteach single-column addition by endings.

1. **Problem** Dick bought red crayons for 6¢, yellow crayons for 9¢, and blue crayons for 8¢. How much did Dick spend for all the crayons he bought? 23¢

Explanation Write the numbers one under another. Begin at the bottom of the column and add up. Think, "8 + 9 = 17. 17 + 6 = 23." Write 23. You can add the numbers faster if you think only "8, 17, 23." Dick spent 23¢ for crayons.

6
9
8
23

2. Betty spent 5¢ for a pencil, 8¢ for some paper, and 3¢ for a pen. How much money did Betty spend? 16¢

3. Tom bought things that cost 6¢, 9¢, 7¢, and 5¢. How much did these things cost? 27¢

Add to class chart.

To find the cost of several things, you add.

Add up. Check by adding down: Urge pupils to increase speed.

4.	8	2	7	8	9	4	6	7
	7	6	8	7	3	8	5	5
	7	5	6	2	7	2	7	6
	22	13	21	17	19	14	18	18

5.	9	7	3	7	9	2	6	8
	5	6	9	8	5	7	5	4
	4	9	3	4	5	3	8	4
	8	5	1	1	4	6	7	3
	26	27	16	20	23	18	26	19

More Practice. See ⑤ on page 314.

Pupils who have difficulty should have much more practice in this skill. Use adding-by-endings cards for drill and "More Practice" pages. Stress fact that end figure is known through basic fact.

Carrying in Addition

1. **Problem** Monday the boys sold 65 tickets for the school play and the girls sold 58. How many tickets in all were sold on Monday? 123

Explanation Think, "8 ones + 5 ones = 13 ones, or 1 ten and 3 ones." Write 3 in ones place and carry 1 ten to tens place. Then think, "1 ten + 5 tens + 6 tens = 12 tens, or 1 hundred and 2 tens." Write 1 in hundreds place and 2 in tens place. The answer is 123. So 123 tickets were sold on Monday. Check the work by adding down to see if you get 123 again.

$$\begin{array}{r}65\\ \underline{58}\\ 123\end{array}$$

2. **Problem** Tuesday the boys sold 109 tickets and the girls sold 125 tickets. How many tickets was this all together? 234

Explanation Think, "5 + 9 = 14." Write 4 in ones place and carry 1 ten to tens place. Then think, "1 + 2 + 0 = 3." Write 3 in tens place. Next think, "1 + 1 = 2." Write 2 in hundreds place. The answer is 234. So 234 tickets were sold on Tuesday.

$$\begin{array}{r}109\\ \underline{125}\\ 234\end{array}$$

3. **Problem** In a week the boys had sold 385 tickets and the girls, 438 tickets. How many tickets in all were sold? 823

Explanation Think, "8 + 5 = 13." Write 3 in ones place and carry 1 ten to tens place. Think, "1 + 3 + 8 = 12." Write 2 in tens place and carry 1 hundred to hundreds place. Think, "1 + 4 + 3 = 8." Write 8 in hundreds place. The answer is 823. In all, 823 tickets were sold. Check the work by adding down.

$$\begin{array}{r}385\\ \underline{438}\\ 823\end{array}$$

Use place pocket chart to demonstrate carrying and exchange in ex. 1–3. Stress adding ones to ones, and so on, and adding the number carried immediately. See G–15, 16 for another method, using pupils.

Provide further practice in carrying. Reteach dollar and cent relationship (ex. 9-10).

Addition Practice

Add these numbers. Check your work:

1.	53	27	29	61	589	184	578
	61	46	13	28	67	459	369
	114	73	42	89	656	643	947
2.	25	15	59	36	236	188	767
	85	38	19	64	331	703	78
	110	53	78	100	567	891	845
3.	37	35	28	14	448	354	267
	89	17	56	31	178	495	725
	126	52	84	45	626	849	992
4.	39	79	45	86	369	231	469
	34	18	33	36	586	386	365
	73	97	78	122	955	617	834

Copy the numbers in columns and add:

5. 34 + 12 + 43 89 14 + 56 + 23 93

6. 25 + 60 + 32 117 37 + 25 + 44 106

7. 43 + 52 + 23 118 48 + 32 + 65 145

8. Today Tom practiced his lesson on the drum three times. He practiced 30 min., 35 min., and 45 min. How many minutes is that all together? 110 Is it more or less than 1 hr.? More

9. At the school store Bill spent 35¢, 27¢, and 84¢. How much in all did Bill spend? 146¢; $1.46

Stress. ▶ When an answer is 100¢ or more, change it to dollars and cents. Use toy money to demonstrate.

10. Find the sum of 18¢, 39¢, 25¢, and 35¢. $1.17

More Practice. See ⑥ on page 315. Use to reinforce carrying process.

Have pupils explain some examples involving carrying, telling how and why they are carrying. Let them use pocket chart to demonstrate.

Present word problems. Review decimal point.

Do You Like to Read?

1. In our school library this week there is an exhibit of new books for children. There are 30 story books, 18 travel books, 26 animal books, and 52 other books for boys and girls. How many new books are there all together? 126

2. The library is open each school day from 9:30 A.M. until 3:30 P.M. How many hours is it open each day? 6 This week it is to be open on Saturday from 1:00 P.M. until 5:15 P.M. How long will it be open on Saturday? 4 hours 15 minutes

3. Mothers, fathers, and friends of the children also come to see the book exhibit. So far this week there have been 22 mothers, 10 fathers, and 19 friends at the book exhibit. How many have come so far this week? 51 people

4. Jack showed his mother three books he would like for Christmas. One book is about boats and costs \$2.50. Another tells how to make things and costs \$3.75. The third is about horses and costs \$1.95. How much do the three books cost all together? \$8.20 How much less than \$10.00 is this? \$1.80

In problems involving money, remind pupils that pennies are added to pennies, dimes to dimes, and so on. Review equivalences of pennies and dimes, dimes and dollars. Let pupils explain their work at blackboard.

5. Mary wants two books about travel for her birthday. One costs $1.75 and the other costs $2.35. How much do both books cost? $4.10

6. Bill wants to show his father the books on Saturday afternoon. Bill will show him two books he would like to have. One is a story book that costs $1.85. The other tells how to make toy airplanes. It costs $2.50. How much will both books cost? $4.35

7. Add these numbers:
$5.76 + $6.63 + $5.45 $17.84 $7.93 + $.58 + $4.28 $12.79

Add up. Check by adding down:

8.	24	221	459	$3.93	$8.67	$.38
	82	306	284	2.66	7.65	.56
	36	212	716	7.48	4.03	.73
	142	739	1459	$14.07	$20.35	$1.67
9.	70	575	669	$5.84	$9.76	$.49
	44	349	255	6.22	2.98	.87
	24	717	764	8.27	.36	.59
	138	1641	1688	$20.33	$13.10	$1.95

More Practice. See ⑦ on page 315.

See suggestions for page 26. Use "More Practice" pages to give individual assistance to pupils still having difficulty with carrying in addition. Let others work at arithmetic corner.

Note that check of subtraction is based on fact that subtraction is the inverse operation of addition.

Subtracting Larger Numbers

1. Problem Last year Peter weighed 64 pounds. This year he weighs 76 pounds. How many more pounds does he weigh this year than last? 12

Explanation Think, "4 ones from 6 ones, 2 ones." Write 2 in ones place. Think, "6 tens from 7 tens, 1 ten." Write 1 in tens place. The answer is 12. So Peter weighs 12 pounds more this year. To check the work, add the answer, 12, to 64 and see if the sum is 76. Add up and think, "2 + 4 = 6. 1 + 6 = 7." You get 76, so the work is right.

$$\begin{array}{r} 76 \\ \underline{64} \\ 12 \end{array}$$

In the example above, the answer, 12, is called the **remainder.** Add to vocabulary chart (page 5).

2. Study these subtraction examples. Then check the work:

498	136	756	166	389	729
175	92	426	124	383	329
323	44	330	42	6	400

Subtract these numbers. Check you[illegible]k:

3.	79	83	78	87	689	265	477
	54	20	26	80	546	202	314
	25	63	52	7	143	63	163
4.	45	37	67	68	128	537	118
	13	22	47	34	73	536	57
	32	15	20	34	55	1	61

More Practice. See ⑧ on page 315.

To the Teacher. See page 329 for the additive method of subtraction.

Stress subtraction of ones from ones, and so on. Show some examples on pocket chart. Do ex. 2 orally with pupils; remind them that 1 hundred and 3 tens is same as 13 tens. Ask why there is no zero in remainder in fourth example.

Subtraction with Regrouping

1. **Problem** Ann bought 45 stamps. She put 28 of them on Christmas cards. How many were left? 17

Explanation Subtract 28 from 45 to get the answer.

You cannot take 8 ones from 5 ones, so take 1 ten and put it with the 5 ones. You now have 3 tens and 15 ones. Think, "8 ones from 15 ones, 7 ones." Write 7 in ones place. Think, "2 tens from 3 tens, 1 ten." Write 1 in tens place. The answer is 17. Ann had 17 stamps left.

$$\begin{array}{r} \overset{3}{\cancel{4}}\overset{15}{\cancel{5}} \\ \underline{28} \\ 17 \end{array}$$

2. **Problem** Bill has 384 stamps. Fred has 175. How many more stamps has Bill than Fred? 209

Explanation You cannot subtract 5 ones from 4 ones. So you take 1 ten from 8 tens and put it with the 4 ones. You now have 7 tens and 14 ones. Think, "5 ones from 14 ones, 9 ones." Write 9 in ones place. Think, "7 tens from 7 tens, 0 tens." Write 0 in tens place. Think, "1 hundred from 3 hundreds, 2 hundreds." Write 2 in hundreds place. The answer is 209. Bill has 209 more stamps than Fred.

$$\begin{array}{r} 3\overset{7}{\cancel{8}}\overset{14}{\cancel{4}} \\ \underline{175} \\ 209 \end{array}$$

Subtract these numbers. Check your work:

3. $\begin{array}{r} 93 \\ \underline{55} \\ 38 \end{array}$ $\begin{array}{r} 67 \\ \underline{49} \\ 18 \end{array}$ $\begin{array}{r} 52 \\ \underline{28} \\ 24 \end{array}$ $\begin{array}{r} 80 \\ \underline{65} \\ 15 \end{array}$ $\begin{array}{r} 885 \\ \underline{527} \\ 358 \end{array}$ $\begin{array}{r} 786 \\ \underline{179} \\ 607 \end{array}$ $\begin{array}{r} 794 \\ \underline{237} \\ 557 \end{array}$

4. 71 − 28 43 98 − 69 29 85 − 36 49 41 − 15 26

More Practice. See ⑨ on page 316. Use to reinforce skill.

To the Teacher. See page 329 for the additive method of subtraction.

Use pocket chart or pupils (see G-17) to demonstrate regrouping in ex. 1-2. Let pupils explain how and why they regroup in ex. 3-4. Stress regrouping of 1 "ten" or "hundred" (not 1).

Reteach double regrouping with zeros in minuend (pages 30-31).

More about Regrouping

1. Problem Jack's father drove Jack 425 miles to camp. They went 198 miles the first day. How many more miles did they have to go? 227

$$\begin{array}{r} \overset{3}{\cancel{4}}\overset{\overset{11}{\cancel{1}}}{\cancel{2}}\overset{15}{\cancel{5}} \\ 198 \\ \hline 227 \end{array}$$

Explanation You cannot subtract 8 ones from 5 ones, so take 1 ten from 2 tens and change it to 10 ones. 10 ones + 5 ones = 15 ones. You can now take 8 ones from 15 ones. Think, "8 from 15, 7." Write 7 in ones place.

Since you changed 1 ten to 10 ones, only 1 ten is left. You cannot subtract 9 tens from 1 ten, so take 1 hundred from 4 hundreds and change it to 10 tens. 10 tens + 1 ten = 11 tens. You can now take 9 tens from 11 tens. Think, "9 from 11, 2." Write 2 in tens place.

Since you changed 1 hundred to 10 tens, only 3 hundreds are left. Think, "1 from 3, 2." Write 2 in hundreds place. They had to go 227 miles more.

2. Problem Susan's mother had 300 Christmas seals. She gave Susan 125 of them. How many seals did she have left? 175

A

$$\begin{array}{r} 300 \\ 125 \\ \hline \end{array}$$

B

$$\begin{array}{r} 29\overset{10}{0} \\ 125 \\ \hline 175 \end{array}$$

Explanation Look at A at the right. You cannot take 5 ones from 0 ones. There are no tens, so you cannot change 1 ten to 10 ones. But you can think of 300 as 290 + 10 and write it as shown at B. Then think, "5 from 10, 5." Write 5 in ones place. Think, "2 from 9, 7." Write 7 in tens place. Think, "1 from 2, 1." Write 1 in hundreds place. Susan's mother had 175 seals left.

To the Teacher. See page 329 for the additive method of subtraction.
As on page 29, use pocket chart (with bundles of hundreds, tens, and single sticks) to demonstrate, or use pupils (see G-17). Helping numbers may be used if pupils need them. Ex. 2 explanation may be reinforced in same way. Do other examples like ex. 2 before proceeding.

Problems and Practice

1. Patty has saved $5.00. She wants to spend $1.95 and put the rest in her bank. How much money will go in Patty's bank? $3.05

2. In Andy's school there are 323 children. There are 185 girls all together. How many boys are there? 138

3. On Uncle Ben's ranch there are 175 sheep and 210 horses. How many more horses than sheep are there on the ranch? 35

4. Our school packed 400 Red Cross boxes for children in other lands. There were 215 boxes for boys. The rest were for girls. How many boxes were for girls? 185

Subtract these numbers. Check your work: Stress.

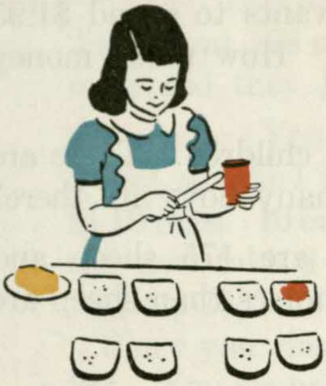
5.	750 358 392	283 99 184	400 164 236	956 469 487	529 357 172	800 556 244
6.	674 388 286	600 273 327	331 284 47	343 57 286	900 647 253	425 79 346
7.	941 269 672	646 487 159	552 293 259	924 787 137	800 396 404	436 242 194
8.	674 644 30	637 198 439	921 156 765	800 621 179	962 365 597	920 460 460

More Practice. See ⑩ on page 316. Use for further reteaching.

Have pupils do some problems orally, explaining how and why they are regrouping. Stress order of subtraction (ones from ones, tens from tens).

Reteach meaning of, and vocabulary and sign for, multiplication. Review facts of the 2's and 3's (pages 32-34).

The Meaning of Multiplication

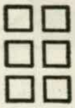


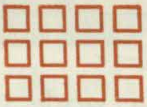
1. How many pieces of bread is Mary using for 4 sandwiches? 8 Count the pieces by 2's. How many pieces are there? 8

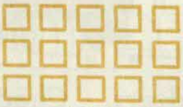
2. You can also add four 2's to find the answer. How many are 2 + 2 + 2 + 2?

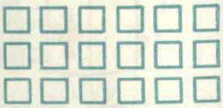
3. Another way to find the answer is by **multiplying,** as shown at the right. You say, "Four 2's are 8." You may also write the example this way: 4 × 2 = 8. The sign × means **multiply.** You read it "4 times 2 are 8." 4 × 2 = 8 is a **multiplication fact.** The answer, 8, is the **product.**

$$\begin{array}{r}2\\ \times 4\\ \hline 8\end{array}$$


A


B


C


D

4. Which picture above shows that 4 × 3 = 12? B

5. Tell what multiplication facts the other pictures above ex. 4 show. (A) 2 x 3 = 6, (C) 5 x 3 = 15, (D) 6 x 3 = 18

6. Use play pennies to show what 7 × 2 equals. How much is 7 × 2? 14

Tell the numbers that go where the dots are: Prove by addition.

7. 6 × 2 = 12 . .   5 × 3 = 15 . .   Two 3's = 6 . .

8. 3 × 2 = 6 . .   5 × 2 = 10 . .   Nine 2's = 18 . .

9. 6 × 3 = 18 . .   8 × 2 = 16 . .   Four 3's = 12 . .

Let pupils use objects to show and add equal groups in ex. 1-6. Stress fact that multiplication is short way of adding equal groups. Have pupils read facts in ex. 7-9, as six 2's are..., and so on. Add new terms to chart.

The 2's in Multiplication

1. Here are the multiplication facts for the 2's. You learned them last year. Cover the products and see if you know them. Practice until you can give all the products quickly: Make flash cards if necessary.

2	2	2	2	2	2	2	2	2
1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	18

1	2	3	4	5	6	7	8	9
2	2	2	2	2	2	2	2	2
2	4	6	8	10	12	14	16	18

2. How many are seven 2's? 14 five 2's? 10 eight 2's? 16 two 2's? 4 two 9's? 18 two 6's? 12 two 4's? 8 two 8's? 16 two 5's? 10

3. How much will 4 tickets cost at \$2 each? \$8

4. How much will 2 dresses cost at \$8 each? \$16

5. Find the cost of 2 pencils at 5¢ each. 10¢ Find the cost of 9 marbles at 2¢ each. 18¢

6. Joe's mother buys 2 quarts of milk every day. How many quarts of milk does she buy in 7 days? 14

7. Alice is making 8 books. She needs 2 covers for each one. How many covers does she need for 8 books? 16

Multiply these numbers: Prove by addition.

8.	8	2	3	2	9	6	2	2	2
	2	4	2	1	2	2	5	2	3
	16	8	6	2	18	12	10	4	6
9.	5	2	2	7	1	2	4	2	9
	2	6	2	2	2	8	2	7	2
	10	12	4	14	2	16	8	14	18

In ex. 1, be sure pupils say "one 2 is...," "two 2's are...," and so on. Let pupils who have difficulty make dot drawings or use addition to discover answers.

The 3's in Multiplication

1. Count by 3's to 30. 3,6,9,12,15,18,21,24,27,30 How much is 3 + 3 + 3 + 3? 12 How many are four 3's? 12 three 4's? 12

2. Here are the multiplication facts for the 3's. You learned them last year. Cover the answers and see if you know them. Practice them until you can give all the answers quickly: Make flash cards.

3	3	3	3	3	3	3	3	3
1	2	3	4	5	6	7	8	9
3	6	9	12	15	18	21	24	27

1	2	3	4	5	6	7	8	9
3	3	3	3	3	3	3	3	3
3	6	9	12	15	18	21	24	27

3. How many are eight 3's? 24 four 3's? 12 three 3's? 9 six 3's? 18 three 9's? 27 three 5's? 15 three 7's? 21

4. Tom bought three 5-cent stamps for his mother. How much did he pay for the stamps? 15¢

5. Find the cost of three 7-cent stamps. 21¢ Find the cost of six 3-cent stamps. 18¢

6. Ann's father bought 4 tickets to the circus. Each ticket cost $3. How much did he pay for the tickets? $12

7. Jack bought 3 candy bars at 7¢ each. How much did he pay for the candy bars? 21¢

8. Find the cost of 3 books at $3 each. $9

Multiply these numbers: Prove by addition.

9.	3	7	3	3	3	8	3	2	3
	4	3	9	3	6	3	5	3	8
	12	21	27	9	18	24	15	6	24

See suggestions for pages 32–33 to develop the 3's. Have pupils build multiplication table; see G–18 for directions.

Review the commutative principle for multiplication.

How to Help Yourself

1. You know that most multiplication facts come in pairs. 5 × 3 = 15 and 3 × 5 = 15 make a pair of multiplication facts. The numbers are the same in each pair but they are **reversed.** Both facts above have 15 for the **product.**

$\begin{array}{r} 3 \\ \times 5 \\ \hline 15 \end{array}$ $\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$

2. What fact goes with 9 × 3 to make a pair? 3x9 What is the product for both facts? 27

3. Suppose you forget the answer for 3 × 8. Reverse the numbers and get 8 × 3. You know that 8 × 3 = 24. Then what is the answer for 3 × 8? 24

4. How many are 6 × 3? 18 How many are 3 × 6? 18

5. How many are 9 × 2? 18 How many are 2 × 9? 18

6. How many are 7 × 3? 21 How many are 3 × 7? 21

7. How many are 9 × 3? 27 How many are 3 × 9? 27

What numbers should be put in the spaces below?

8. 3 × 5 = 5 × . 3 . = . 15 . 2 × 9 = 9 × . 2 . = . 18 .

9. 3 × 8 = 8 × . 3 . = . 24 . 3 × 4 = 4 × . 3 . = . 12 .

10. 2 × 6 = 6 × . 2 . = . 12 . 3 × 7 = 7 × . 3 . = . 21 .

11. If you forget the answer to both 8 × 3 and 3 × 8, there is another way to help yourself. You know that 4 × 3 = 12. Since 8 is two times 4, 8 × 3 must be 2 × 12, or 24. Demonstrate with objects.

12. How much is 3 × 2? 6 Then how much is 6 × 2? 12

13. How much is 3 × 3? 9 Then how much is 6 × 3? 18

14. How much is 4 × 2? 8 Then how much is 8 × 2? 16

Remind pupils of commutative principle for addition, and since multiplication is short form of addition, same applies. Let pupils check on own tables and by showing 5 groups of 3's, then 3 groups of 5's.

Note that 1 is called the identity element of multiplication since "and number × 1 = that number."

The 1's and 0's in Multiplication

1. Tom and Dick each have 1 apple. How many apples have they together?2 How many are 1 + 1?2 How many are two 1's?2 How many are 2 × 1?2 How many are 1 × 2?2

$\begin{array}{r}1\\ \times 2\\ \hline 2\end{array} \quad \begin{array}{r}2\\ \times 1\\ \hline 2\end{array}$

2. Mary Ann, Betty, and Peggy each have 1 cookie. How many cookies have they in all?3 How many are three 1's?3 How many are 3 × 1?3

$\begin{array}{r}1\\ \times 3\\ \hline 3\end{array} \quad \begin{array}{r}3\\ \times 1\\ \hline 3\end{array}$

3. 2 × 1 = . 2 ., so 1 × 2 = . 2 . . Two 1's = . 2 . .

4. 3 × 1 = . 3 ., so 1 × 3 = . 3 . . Three 1's = . 3 . .

5. Jim and Ted each have **no** apples. How many apples have they together?0 How many are 0 + 0?0 How many are two 0's?0 How many are 2 × 0?0

6. How many are 0 + 0 + 0?0 How many are 3 × 0?0

7. You know that 3 × 0 = 0. If you reverse the numbers, the product is still 0. This shows that 0 × 3 = 0.

$\begin{array}{r}0\\ \times 3\\ \hline 0\end{array} \quad \begin{array}{r}3\\ \times 0\\ \hline 0\end{array}$

8. How many are 8 × 0?0 0 × 7?0 4 × 0?0 0 × 5?0

Any number × 1 = that number.
Any number × 0 = 0.

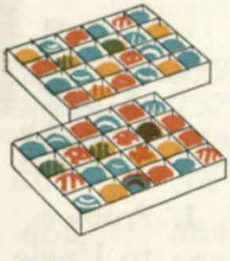
Give the answers:

9. $\begin{array}{r}1\\ 5\\ \hline 5\end{array} \quad \begin{array}{r}0\\ 9\\ \hline 0\end{array} \quad \begin{array}{r}6\\ 0\\ \hline 0\end{array} \quad \begin{array}{r}1\\ 8\\ \hline 8\end{array} \quad \begin{array}{r}4\\ 0\\ \hline 0\end{array} \quad \begin{array}{r}9\\ 1\\ \hline 9\end{array} \quad \begin{array}{r}1\\ 6\\ \hline 6\end{array} \quad \begin{array}{r}0\\ 7\\ \hline 0\end{array} \quad \begin{array}{r}1\\ 4\\ \hline 4\end{array}$

Stress additive nature of multiplication, as two 1's are 2, one 2 is 2, and so on, in developing facts of 1's and 0's. Enter facts on tables.

Multiplying Larger Numbers

1. **Problem** Mother bought 2 boxes of Christmas tree balls. There were 24 balls in each box. How many Christmas tree balls did she buy? 48



Explanation You can add 24 and 24 to find the answer. You can also multiply 24 by 2, as shown at the right.

Think, "2 × 4 ones = 8 ones." Write 8 in ones place. Think, "2 × 2 tens = 4 tens." Write 4 in tens place. The answer is 48. Mother bought 48 Christmas tree balls. To check the work, go over it carefully.

$$\begin{array}{r}24\\2\\\hline 48\end{array}$$

2. **Problem** Each box of Christmas tree balls cost \$1.20. How much did Mother pay for 2 boxes? \$2.40

Explanation Think, "2 × 0¢ = 0¢." Write 0 in cents place. Think, "2 × 2 dimes = 4 dimes." Write 4 in dimes place. Think, "2 × \$1 = \$2." Write 2 in dollars place. Put a decimal point before the last two figures to keep the dollars and cents apart. Write the sign \$. Mother paid \$2.40 for balls for the tree.

$$\begin{array}{r}\$1.20\\2\\\hline \$2.40\end{array}$$

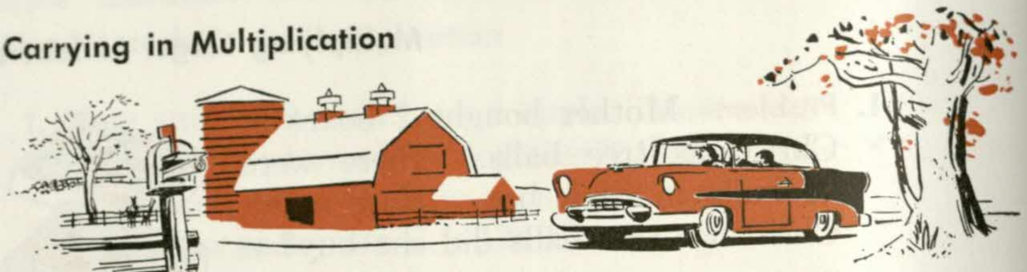
Multiply and check your work: Check by addition.

3.	32	44	30	13	\$2.20	\$3.14	\$1.04
	3	2	2	3	3	2	2
	96	88	60	39	\$6.60	\$6.28	\$2.08
4.	20	40	31	20	\$4.10	\$3.00	\$1.42
	3	2	3	2	2	3	2
	60	80	93	40	\$8.20	\$9.00	\$2.84

More Practice. See ⑪ on page 316.

Find answers in ex. 1-2 by addition first, stressing order (add ones first). Then discuss explanations above, stressing place value of figures multiplied (multiplying ones gives ones, tens gives tens) and order of multiplication.

Carrying in Multiplication



1. **Problem** Yesterday Bill's father drove the family to Uncle Tom's farm. The trip was 125 miles each way. How many miles was the round trip? 250

125
2
250

Explanation Multiply 125 by 2 to find the answer. Think, "2 × 5 ones = 10 ones, or 1 ten and 0 ones." Write 0 in ones place and carry 1 ten to tens place. Think, "2 × 2 tens = 4 tens. 4 tens and 1 ten (carried) = 5 tens." Write 5 in tens place. Think, "2 × 1 hundred = 2 hundreds." Write 2 in hundreds place. The answer is 250, so the round trip was 250 miles.

Multiply. Check your work by going over it:

2.	36 2 72	49 2 98	25 3 75	17 3 51	214 3 642	118 2 236	206 3 618
3.	13 4 52	38 3 114	32 6 192	18 2 36	409 2 818	307 3 921	146 2 292
4.	46 3 138	57 2 114	23 5 115	19 3 57	119 3 357	335 2 670	109 2 218
5.	23 6 138	27 3 81	12 9 108	45 2 90	108 3 324	126 3 378	148 2 296
6.	95 2 190	22 7 154	66 3 198	23 8 184	227 2 454	315 3 945	208 2 416

Stress that carried number is added "after" multiplication of tens. Ask pupils why (we only multiply original numbers). Do work orally to check this. Do not use helping numbers.

Mixed Practice

Add and check the work:

1.	44	26	46	31	47	389	499
	13	23	15	47	55	279	257
	32	34	43	17	28	139	356
	89	83	104	95	130	807	1112

2.	45	33	56	10	78	665	884
	32	65	86	63	13	389	307
	14	20	15	12	67	100	962
	63	12	51	21	34	717	279
	154	130	208	106	192	1871	2432

Subtract and check the work:

3.	516	470	954	678	1400	1500
	237	466	368	589	790	914
	279	4	586	89	610	586

4.	674	969	845	815	7889	3248
	295	237	689	457	5525	1230
	379	732	156	358	2364	2018

5. Subtract 275 from each number below:
489 214 776 501 523 248 314 39 600 325 804 529

6. Add 139 to each number in ex. 5. 628, 915, 662, 453, 739, 943

7. Multiply each number below by 3:
123 369 227 681 218 654 121 363 210 630 309 927

Multiply and check the work:

8.	56	22	37	44	436	103	112
	3	9	2	3	2	7	6
	168	198	74	132	872	721	672

9.	59	20	56	35	326	202	127
	2	8	2	3	2	4	2
	118	160	112	105	652	808	254

Remind pupils to follow directions. Note errors or hesitancy on progress cards. Determine if facts or processes cause difficulty and plan reteaching or drill.

Carrying from Tens Place

1. **Problem** Mary and Jim went by bus to Greenfield. Each ticket cost $3.50. How much did Jim pay for the 2 tickets to Greenfield? $7.00

Explanation Here is a short way to think:
Cents: $2 \times 0 = 0$. Write 0 in cents place.
Dimes: $2 \times 5 = 10$. Write 0 in dimes place and carry 1 to dollars place.
Dollars: $2 \times 3 = 6$. $6 + 1$ (carried) $= 7$. Write 7 in dollars place. Jim paid $7.00 for the tickets.

$$\begin{array}{r} \$3.50 \\ 2 \\ \hline \$7.00 \end{array}$$

2. Find the cost of 4 bus tickets at $2.72 each $10.88

3. Find the cost of 3 circus tickets at $1.80 each $5.40

Multiply. Check by going over your work:

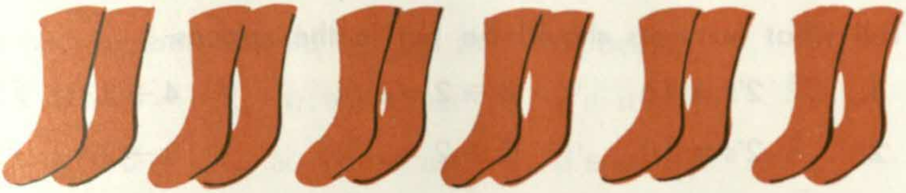
4.	152	384	281	$1.70	$3.21	$1.32
	3	2	3	3	6	4
	456	768	843	$5.10	$19.26	$5.28
5.	452	130	263	$2.21	$2.70	$1.21
	2	4	3	8	2	9
	904	520	789	$17.68	$5.40	$10.89
6.	362	280	161	$2.31	$1.20	$2.30
	3	3	2	5	7	4
	1086	840	322	$11.55	$8.40	$9.20

More Practice. See ⑫ on page 317.

Review equivalence of dimes and dollars. If pupils have difficulty with decimal point refer them to additive solution. Lead pupils to see that hundreds are carried just as tens are carried. Have pupils do some examples orally.

Reteach meaning of, and vocabulary and signs for, division. Review facts of 2's. Add new terms and signs to chart (page 5).

The Meaning of Division



1. Mary cut out 12 pieces of red cloth to make Christmas stockings. She used 2 pieces for each stocking. How many stockings did Mary make from 12 pieces? 6

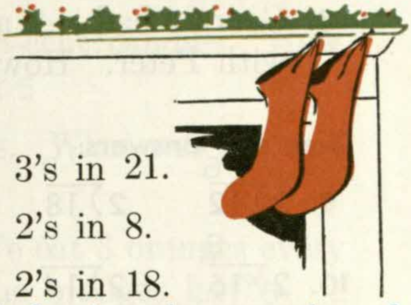
▶ Look at the picture above. How many groups of 2 pieces each do you see? 6 How many 2's are there in 12? 6

2. Another way to say there are six 2's in 12 is "12 divided by 2 is 6." A short way to write it is like this: 12 ÷ 2 = 6. The sign ÷ means **divided by.** 12 ÷ 2 = 6 is a **division fact.** To find how many 2's there are in 12, you can **divide.**

3. Another way to write 12 ÷ 2 = 6 is shown at the right. It is also read "12 divided by 2 equals 6." The answer, 6, is called the **quotient.** Learn to spell **quotient.**

$$\begin{array}{r}6\\2\overline{)12}\end{array}$$

4. How many are 5 × 2? 10 How many 2's make 10? 5 Then how many are 10 ÷ 2? 5 What is the answer to $2\overline{)10}$? 5



5. How many are 8 × 3? 24
How many are 24 ÷ 3? 8

6. 7 × 3 = . . . 21, so there are . . . 7 3's in 21.

7. 4 × 2 = . . . 8, so there are . . . 4 2's in 8.

8. 9 × 2 = . . . 18, so there are . . . 9 2's in 18.

Have pupils use objects or make dot drawings to separate and count groups in ex. 1-8. Have them tell number of dots in whole group, in each equal group, number of groups, then "how many 2's in...?" Stress discovery of facts through multiplication facts.

Reteach division facts of 2's.

Dividing by 2

Tell what numbers should be put in the spaces:

1. . .8. 2's = 16 $\quad$ $8 \div 2 =$ . .4. $\quad$ $4 \div 2 =$ . .2.

2. . .5. 2's = 10 $\quad$ $2 \div 2 =$ . .1. $\quad$ $18 \div 2 =$ . .9.

3. . .7. 2's = 14 $\quad$ $6 \div 2 =$ . .3. $\quad$ $12 \div 2 =$ . .6.

4. Here are all the division facts for the 2's. You learned them last year. Practice them until you can give all the quotients quickly: Make flash cards.

$\overset{1}{2\overline{)2}}$ $\quad$ $\overset{2}{2\overline{)4}}$ $\quad$ $\overset{3}{2\overline{)6}}$ $\quad$ $\overset{4}{2\overline{)8}}$ $\quad$ $\overset{5}{2\overline{)10}}$

$\overset{6}{2\overline{)12}}$ $\quad$ $\overset{7}{2\overline{)14}}$ $\quad$ $\overset{8}{2\overline{)16}}$ $\quad$ $\overset{9}{2\overline{)18}}$

5. Andy had 10¢. He spent it all for candy sticks at 2¢ each. How many sticks did Andy get? 5

6. On the playground 16 children did a country dance. The children danced in pairs. How many pairs of children were in the dance? 8

7. The 16 children in the country dance were divided into 2 groups. How many children were there in each group? 8

8. George had 14 apples. He shared them equally with Peter. How many apples did each boy have? 7

Give the answers:

9. $\overset{6}{2\overline{)12}}$ $\quad$ $\overset{9}{2\overline{)18}}$ $\quad$ $\overset{2}{2\overline{)4}}$ $\quad$ $\overset{5}{2\overline{)10}}$ $\quad$ $\overset{3}{2\overline{)6}}$ $\quad$ $\overset{7}{2\overline{)14}}$

10. $\overset{8}{2\overline{)16}}$ $\quad$ $\overset{7}{2\overline{)14}}$ $\quad$ $\overset{4}{2\overline{)8}}$ $\quad$ $\overset{9}{2\overline{)18}}$ $\quad$ $\overset{1}{2\overline{)2}}$ $\quad$ $\overset{6}{2\overline{)12}}$

Have pupils prove facts in ex. 4 by multiplication and subtraction. Let pupils use dot drawings in ex. 5-8 if necessary. Have them express facts in ex. 9-10 in various ways: how many 2's in 12, 12 divided by 2, 12 ÷ 2, there are six 2's in 12, 2 can be subtracted from 12 six times.

Help in remembering division facts is based on idea that division is the inverse operation of multiplication.

Dividing by 3

What numbers should be put in the spaces?

1. 6 × 3 = .18., so there are .6. 3's in 18.

2. 9 × 3 = .27., so there are .9. 3's in 27.

3. 4 × 3 = .12., so there are .4. 3's in 12.

4. You learned these division facts last year. Practice them until you can give the answers quickly:

$\begin{array}{r}1\\3\overline{)3}\end{array}$ $\begin{array}{r}2\\3\overline{)6}\end{array}$ $\begin{array}{r}3\\3\overline{)9}\end{array}$ $\begin{array}{r}4\\3\overline{)12}\end{array}$ $\begin{array}{r}5\\3\overline{)15}\end{array}$

$\begin{array}{r}6\\3\overline{)18}\end{array}$ $\begin{array}{r}7\\3\overline{)21}\end{array}$ $\begin{array}{r}8\\3\overline{)24}\end{array}$ $\begin{array}{r}9\\3\overline{)27}\end{array}$

5. If you forget the answer to a division fact like 18 ÷ 3, ask yourself this question: How many 3's make 18? 6 × 3 = 18 tells you that six 3's are 18. Then you know that 18 ÷ 3 = 6. The multiplication facts will help you with the division facts.

Give the quotients: Prove by multiplication and subtraction.

6. $\begin{array}{r}2\\3\overline{)6}\end{array}$ $\begin{array}{r}7\\3\overline{)21}\end{array}$ $\begin{array}{r}4\\3\overline{)12}\end{array}$ $\begin{array}{r}3\\3\overline{)9}\end{array}$ $\begin{array}{r}8\\3\overline{)24}\end{array}$ $\begin{array}{r}9\\3\overline{)27}\end{array}$

7. $\begin{array}{r}3\\3\overline{)9}\end{array}$ $\begin{array}{r}6\\3\overline{)18}\end{array}$ $\begin{array}{r}9\\3\overline{)27}\end{array}$ $\begin{array}{r}1\\3\overline{)3}\end{array}$ $\begin{array}{r}6\\3\overline{)18}\end{array}$ $\begin{array}{r}5\\3\overline{)15}\end{array}$

8. Father gave Ben 15¢ to buy 3-cent candies. How many candies should Ben get? 5

9. Polly paid 18¢ for 3 candy bars. What was the cost of 1 candy bar? 6¢

10. Mother bought 24 oranges. We eat 3 oranges every day. How many days will the oranges last? 8

Follow procedure for pages 41-42, using objects, drawings, relationship to multiplication and subtraction, in developing facts. Make flash cards for further practice.

Reteach division of 2-figure and 3-figure numbers by 2 and 3.

A Trip to the Zoo

1. **Problem** Yesterday 84 fourth grade children in Peter's school went to the zoo. There were 2 busses to take them. The same number of children rode in each bus. How many children rode in each bus? 42

Explanation Divide 84 by 2 like this:

$$\begin{array}{r}42\\2\overline{)84}\end{array}$$

Think, "8 tens ÷ 2 = 4 tens." Write 4 over 8 tens. Think, "4 ones ÷ 2 = 2 ones." Write 2 over 4 ones. The answer is 42. Each bus carried 42 children.

Check the work by multiplying 42 by 2. This gives 84, so the work is right.

Check

$$\begin{array}{r}42\\\underline{2}\\84\end{array}$$

Check based on fact that division is the inverse operation of multiplication.

Divide. Check your work by multiplying:

2. $\overset{24}{2\overline{)48}}$ $\overset{23}{3\overline{)69}}$ $\overset{13}{2\overline{)26}}$ $\overset{12}{3\overline{)36}}$ $\overset{31}{3\overline{)93}}$ $\overset{32}{2\overline{)64}}$

3. $\overset{13}{3\overline{)39}}$ $\overset{41}{2\overline{)82}}$ $\overset{11}{2\overline{)22}}$ $\overset{34}{2\overline{)68}}$ $\overset{23}{2\overline{)46}}$ $\overset{22}{3\overline{)66}}$

Discuss ex. 1 fully with pupils, emphasizing left-to-right direction (tens first, then ones). Be sure pupils understand that dividing tens gives tens, dividing ones gives ones. Demonstrate on pocket chart, if necessary.

4. **Problem** Last week 156 children from the second and third grades went to the zoo. There were 3 busses to carry them. The same number of children rode in each bus. How many rode in each bus? 52

Explanation Divide 156 by 3 like this: You cannot divide 1 hundred by 3 without changing 1 hundred to 10 tens. 10 tens + 5 tens = 15 tens. You can now divide 15 tens by 3. Think, "15 ÷ 3 = 5." Write 5 over the 5 of 15 to show that you have divided 15 tens. Think, "6 ones ÷ 3 = 2 ones." Write 2 over 6 ones. The answer is 52. There were 52 children in each bus.

$$\begin{array}{r}52\\3\overline{)156}\end{array}$$

How do you check the work? Multiply quotient by divisor.

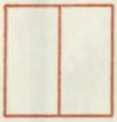
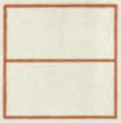
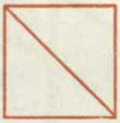
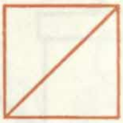
Divide. Check your work by multiplying:

5.	$\begin{array}{r}71\\3\overline{)213}\end{array}$	$\begin{array}{r}52\\2\overline{)104}\end{array}$	$\begin{array}{r}42\\3\overline{)126}\end{array}$	$\begin{array}{r}61\\3\overline{)183}\end{array}$	$\begin{array}{r}61\\2\overline{)122}\end{array}$
6.	$\begin{array}{r}91\\3\overline{)273}\end{array}$	$\begin{array}{r}63\\3\overline{)189}\end{array}$	$\begin{array}{r}73\\2\overline{)146}\end{array}$	$\begin{array}{r}84\\2\overline{)168}\end{array}$	$\begin{array}{r}82\\3\overline{)246}\end{array}$
7.	$\begin{array}{r}83\\2\overline{)166}\end{array}$	$\begin{array}{r}91\\2\overline{)182}\end{array}$	$\begin{array}{r}73\\3\overline{)219}\end{array}$	$\begin{array}{r}62\\2\overline{)124}\end{array}$	$\begin{array}{r}93\\3\overline{)279}\end{array}$

Use place pocket chart in discussing ex. 4 to show exchange and reason for placing 5 in tens place. Have pupils explain some examples, as done in ex. 4. Be sure they give reason for placement of quotient figures.

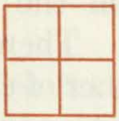
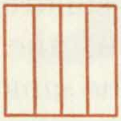
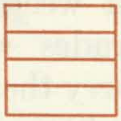
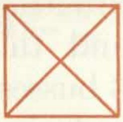
Reteach meaning of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{3}$ of single object.

Finding Equal Parts

1. Look at the four squares above. Each square is divided into 2 equal parts. Each part is **one half** of the square. You write one half like this: $\frac{1}{2}$.

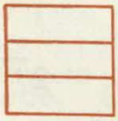
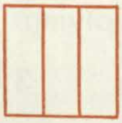
2. You see there are different ways to divide the square into 2 equal parts, or into **halves.** How many halves are there in each square above? 2 This shows that there are 2 halves in 1 whole thing. You write it like this: $\frac{2}{2} = 1$.

3. The squares above are each divided into 4 equal parts. Each part is **one fourth,** or **one quarter,** of the square. You write one fourth like this: $\frac{1}{4}$.

4. How many fourths are there in each square above? 4 This shows that there are 4 fourths in 1 whole thing. You write it like this: $\frac{4}{4} = 1$.

5. Look at the squares above ex. 3. How many fourths are there in $\frac{1}{2}$ square? 2 This shows that 2 fourths equal 1 half. You write it like this: $\frac{2}{4} = \frac{1}{2}$.

6. The squares at the left are each divided into 3 equal parts. Each part is **one third** of the square. You write one third like this: $\frac{1}{3}$.

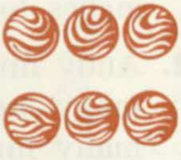
7. How many thirds are there in 1 whole thing? 3

Use flannelboard and fractional parts in demonstrating ex. 1-7. Have pupils make fractional kit (whole circles or squares, and fractional parts). Use to discover that $\frac{2}{2} = \frac{4}{4} = \frac{3}{3} = 1$, and that $\frac{1}{2}$ of object is more than $\frac{1}{4}$ of it.

Reteach meaning of $\frac{1}{2}$ and $\frac{1}{3}$ of group of objects.

Halves and Thirds

1. On page 46 you learned about one half of a whole thing. You can also find one half of a group of things. At the right you see 6 marbles divided into 2 equal groups. Each group is one half of 6 marbles. You see that $\frac{1}{2}$ of 6 marbles is 3 marbles.



2. Another way to write $\frac{1}{2}$ of 6 is like this: $6 \div 2$. Here $6 \div 2$ means that 6 has been divided into 2 equal groups.
3. If 6 pennies are divided into 3 equal groups, how many pennies are there in each group? 2 How many are $6 \div 3$? 2
4. When a group of things is divided into 3 equal parts, each part is called one third, or $\frac{1}{3}$, of the whole number. How many are $\frac{1}{3}$ of 6? 2
5. How many are $\frac{1}{3}$ of 15? 5 $\frac{1}{2}$ of 14? 7 $\frac{1}{3}$ of 27? 9 $\frac{1}{3}$ of 9? 3 $\frac{1}{3}$ of 21? 7 $\frac{1}{2}$ of 18? 9 $\frac{1}{3}$ of 3? 1
6. How many are $\frac{1}{2}$ of 18 nuts? 9 $\frac{1}{3}$ of 18 nuts? 6
7. Which is more, $\frac{1}{2}$ of 18¢ or $\frac{1}{3}$ of 18¢? $\frac{1}{2}$
8. Which part of a pie is larger, $\frac{1}{3}$ of the pie or $\frac{1}{2}$ of the pie? $\frac{1}{2}$
9. Which part of a group of things is more, $\frac{1}{3}$ of the group or $\frac{1}{2}$ of the group? $\frac{1}{2}$

Illustrate and emphasize.

To find $\frac{1}{2}$ of a number, divide it by 2.
To find $\frac{1}{3}$ of a number, divide it by 3.

Let pupils discover, through use of objects, that $\frac{1}{2}$ of group of objects is same as dividing number of objects by 2, and $\frac{1}{3}$ of group is same as dividing by 3. Ask questions such as, "What part of 12 is 4?" "What is $\frac{1}{4}$ of 12?" "What is 12 divided by 4?"

Reteach linear measure dealing with inches, feet, yards. Give pupils opportunity to use ruler in class.

Measures of Length

1. Look at the picture below. Andy is measuring the school work table with a yardstick. How many inches long is a yardstick? 36

2. Andy finds the table is 4 feet 6 inches long. How many inches are there in 1 foot? 12 in 4 feet? 48 How many inches long is the work table? 54

3. Learn this table of measures:

Add to vocabulary chart.

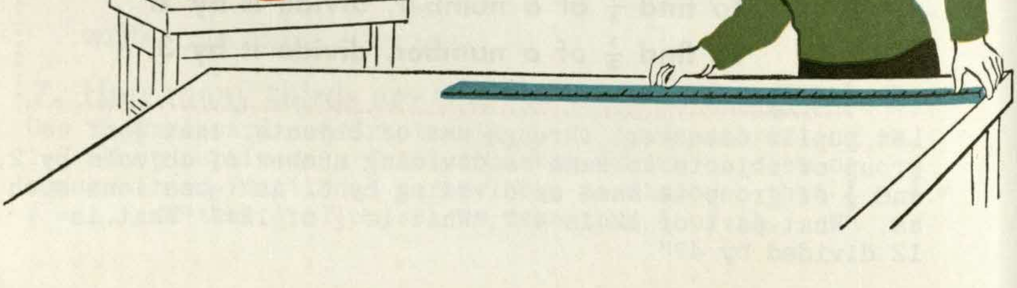
12 inches (in.) = 1 foot (ft.)
3 feet (ft.) = 1 yard (yd.)
36 inches (in.) = 1 yard (yd.)

4. What does in. mean? inch(es) What does ft. mean? foot (feet) What does yd. mean? yard(s) Learn these abbreviations.

5. Mary made a poster for Safety Week. It was 2 ft. 7 in. long and 1 ft. 3 in. wide. How many inches long was it? 31 How many inches wide was it? 15

6. Ask your teacher to draw 5 lines on the blackboard. Then try to tell how long each line is.

Demonstrate and stress relationship between foot and yard. Give other practice similar to ex. 2, 5.



Chapter Review

Add and check the work:

1.	3	7	8	5	64	58	47	52
	4	6	6	1	37	25	64	60
	8	0	9	4	43	94	17	65
	3	8	5	3	36	68	32	44
	18	21	28	13	180	245	160	221

2.	242	216	382	589	185	457
	513	351	228	165	973	309
	132	126	715	816	248	637
	887	693	1325	1570	1406	1403

Subtract and check the work:

3.	297	494	563	985	600	702
	193	467	196	494	245	368
	104	27	367	491	355	334

4. Find the number of inches in 7 ft. 84

5. Find the number of yards in 12 ft. 4

6. Find the number of inches in 1 yd. 9 in. 45

Multiply and check the work:

7.	231	154	482	526	102	109
	3	2	2	3	6	3
	693	308	964	1578	612	327
8.	106	319	213	204	371	243
	2	2	4	3	3	2
	212	638	852	612	1113	486

Divide and check the work:

	21	14	43	72	51	93
9.	$3\overline{)63}$	$2\overline{)28}$	$3\overline{)129}$	$3\overline{)216}$	$2\overline{)102}$	$2\overline{)186}$
	32	33	74	51	64	83
10.	$2\overline{)64}$	$3\overline{)99}$	$2\overline{)148}$	$3\overline{)153}$	$2\overline{)128}$	$3\overline{)249}$

Observe pupils as they work, and note errors or hesitancy on progress cards. Determine if facts, processes, or skills are causing difficulty and reteach accordingly.

Present diagnostic tests (pages 50, 52) of skills and processes retaught, with references to practice pages.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Pages for that row.

Add and check the work:

							Practice Pages
1.	6 1 2 3 12	3 4 1 2 10	3 1 5 3 12	7 3 4 7 21	8 4 5 6 23	5 3 5 9 22	11, 23
2.	74 23 12 109	53 22 24 99	24 33 25 82	64 47 32 143	85 43 58 186	59 62 85 206	25
3.	405 264 669	327 142 469	153 213 366	413 365 778	197 402 599		21
4.	618 337 955	254 682 936	698 146 844	189 233 422	562 138 700		25

Subtract and check the work:

5.	98 36 62	57 17 40	749 516 233	684 682 2	295 105 190	28
6.	62 48 14	90 45 45	372 206 166	791 355 436	554 238 316	29
7.	236 194 42	659 367 292	406 143 263	529 459 70	966 782 184	31
8.	723 148 575	897 499 398	445 377 68	800 656 144	700 543 157	31

Compare results of tests with previous one (page 49) as noted on progress cards. Encourage pupils to make own self-assignments to improve accuracy.

1. Ann saw a man with 5 red balloons, 6 blue balloons, and 5 green balloons. How many balloons did the man have all together? 16

2. Ann bought a green balloon for 18¢. She gave the man a half dollar to pay for it. How much change did the man give Ann? 32¢

3. Jack sells bird houses for $1.50 each. How much does he get for 3 bird houses? $4.50

4. There were 2 busses to carry 108 children to a big farm. Half the children rode in each bus. How many children were in each bus? 54

5. Bill earned $.65 on Monday, $.90 on Friday, and $2.25 on Saturday. How much did he earn in all? $3.80

6. Alice and Sally shared the cost of an 88-cent book. How much did each girl pay? 44¢

7. Tom has 300 stamps. He has 214 stamps of this country. The rest are stamps of other countries. How many stamps of other countries has Tom? 86

8. Last week Dick sold 9 dozen eggs. How many eggs did Dick sell all together? 108 1 dozen = 12 things.

9. Joe needs $4.00 for a leather school bag. He has saved $2.79. How much more does Joe need to save? $1.21

10. There were 107 beads in Betty's string of beads. The string broke and Betty could find only 99 beads. How many beads were gone? 8

This is a test to see how well you can do problems. Did you get every problem right? Each problem counts 10.

Urge pupils to read problems carefully to determine what problem asks them to find, what facts are known, what process must be used, how to write problem in numbers. After test, have pupils pick out key terms in ex. 1-10.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Page for that row.

Practice Pages

Multiply these numbers:

$$\begin{array}{lrrrrrrrr}
\textbf{1.} & 1 & 6 & 2 & 4 & 2 & 9 & 2 & 33\\
 & \underline{2} & \underline{2} & \underline{8} & \underline{2} & \underline{7} & \underline{2} & \underline{5} & \\
 & 2 & 12 & 16 & 8 & 14 & 18 & 10 & \\
\textbf{2.} & 7 & 5 & 3 & 3 & 3 & 3 & 3 & 34\\
 & \underline{3} & \underline{3} & \underline{8} & \underline{9} & \underline{3} & \underline{4} & \underline{6} & \\
 & 21 & 15 & 24 & 27 & 9 & 12 & 18 &
\end{array}$$

Multiply. Check by going over the work:

$$\begin{array}{lrrrrrr}
\textbf{3.} & 23 & 41 & 20 & 304 & 421 & 37\\
 & \underline{2} & \underline{3} & \underline{3} & \underline{2} & \underline{2} & \\
 & 46 & 123 & 60 & 608 & 842 & \\
\textbf{4.} & 28 & 39 & 23 & 207 & 105 & 38\\
 & \underline{3} & \underline{2} & \underline{4} & \underline{3} & \underline{2} & \\
 & 84 & 78 & 92 & 621 & 210 & \\
\textbf{5.} & \$1.93 & \$2.80 & \$2.61 & \$1.73 & & 40\\
 & \underline{3} & \underline{2} & \underline{3} & \underline{2} & & \\
 & \$5.79 & \$5.60 & \$7.83 & \$3.46 & &
\end{array}$$

Divide these numbers:

$$\begin{array}{lrrrrrr}
 & 3 & 7 & 8 & 5 & 9 & \\
\textbf{6.} & 2\overline{)6} & 2\overline{)14} & 2\overline{)16} & 2\overline{)10} & 2\overline{)18} & 42\\
 & 1 & 6 & 8 & 5 & 9 & \\
\textbf{7.} & 3\overline{)3} & 3\overline{)18} & 3\overline{)24} & 3\overline{)15} & 3\overline{)27} & 43
\end{array}$$

Divide and check the work:

$$\begin{array}{lrrrrr}
 & 43 & 11 & 32 & 44 & \\
\textbf{8.} & 2\overline{)86} & 3\overline{)33} & 3\overline{)96} & 2\overline{)88} & 44\\
 & 92 & 81 & 54 & 53 & \\
\textbf{9.} & 3\overline{)276} & 2\overline{)162} & 2\overline{)108} & 3\overline{)159} & 45\\
 & 63 & 81 & 62 & 92 & \\
\textbf{10.} & 2\overline{)126} & 3\overline{)243} & 3\overline{)186} & 2\overline{)184} & 45
\end{array}$$

Plan reteaching based on class or individual needs. See page 50 for other suggestions.

See G-25 for specific aims of Chapter 2.

Chapter 2

Patty's Picture Book

Develop readiness for multiplication facts of 4's.

1. Patty likes to take pictures. She puts them in a book to keep them flat. She can put 4 pictures on each page. How many can she put on 2 pages? 8 How many are two 4's? 8 How many are 2 × 4? 8

2. How many pictures can Patty put on 3 pages? 12 How many are 3 times 4 pictures? 12 How many are three 4's? 12 How many are 3 × 4? 12

3. On 4 pages Patty can put 4 times 4 pictures. You can add four 4's to find the answer. How much is 4 + 4 + 4 + 4? 16 How many are 4 × 4? 16

4. How many are five 4's? 20 Think like this: "Four 4's are 16, so five 4's are 4 more than 16, or ... 20." How many are five 4's? 20 How many are 5 × 4? 20

5. 5 × 4 = 20, so 6 × 4 equals 4 more than 20, or ... 24.

6. How many are 7 × 4? 28 8 × 4? 32 9 × 4? 36 Find the answers as you did in ex. 5.

Some pupils may need to use objects to show arrangements of groups. Stress additive nature of multiplication, as in ex. 3, and have pupils prove facts in ex. 6 in same way.

The 4's in Multiplication

1. Learn these multiplication facts for the 4's. You learned the first three facts in Chapter 1: Make flash cards.

4	4	4	4	4	4	4	4	4
1	2	3	4	5	6	7	8	9
4	8	12	16	20	24	28	32	36

2. How many are five 4's? 20 seven 4's? 28 nine 4's? 36 two 4's? 8 six 4's? 24 eight 4's? 32

3. How many are 3 × 4? 12 1 × 4? 4 5 × 4? 20 4 × 4? 16

4. At 4¢ each, find the cost of 9 apples. 36¢

5. At Tom's party 4 children played games at each table. How many children played at 6 tables? 24

6. Betty made 4 sandwiches for each child at the picnic. There were 8 children all together. How many sandwiches did Betty make? 32
How many are 8 × 4? 32

7. In his garden Bill put 4 plants in each row. How many plants did he put in 7 rows? 28

8. At $4 a pair, find the cost of 2 pairs of shoes. $8

Multiply these numbers: Prove by addition.

9. 4	4	4	4	4	4	4	4	4
6	9	1	4	8	2	7	3	5
24	36	4	16	32	8	28	12	20

Let pupils who have difficulties show facts in ex. 1 by dot drawings. Be sure pupils read facts as, one 4 is 4, two 4's are 8, and so on. Enter new facts on tables.

Teach reverses of multiplication facts of 4's. Reinforce understanding of commutative principle for multiplication.

Multiplying by 4

1. How many are 3 × 4? 12 How many are 4 × 3? 12 You see that 3 × 4 and 4 × 3 each have the same product, which is 12. The numbers in 3 × 4 are the same as those in 4 × 3 except that they are reversed. **If two numbers are reversed, their product is the same.** This is called the commutative principle for multiplication. Emphasize.

$$\begin{array}{r}4\\ \times 3\\ \hline 12\end{array} \qquad \begin{array}{r}3\\ \times 4\\ \hline 12\end{array}$$

2. How many are 5 × 4? 20 If you reverse the numbers, you get 4 × 5. How many are 4 × 5? 20

3. How many are 6 × 4? 24 4 × 6? 24 How many are 8 × 4? 32 4 × 8? 32 How many are 9 × 4? 36 4 × 9? 36

4. Make sure you know these multiplication facts:

$$\begin{array}{r}1\\ 4\\ \hline 4\end{array} \quad \begin{array}{r}2\\ 4\\ \hline 8\end{array} \quad \begin{array}{r}3\\ 4\\ \hline 12\end{array} \quad \begin{array}{r}4\\ 4\\ \hline 16\end{array} \quad \begin{array}{r}5\\ 4\\ \hline 20\end{array} \quad \begin{array}{r}6\\ 4\\ \hline 24\end{array} \quad \begin{array}{r}7\\ 4\\ \hline 28\end{array} \quad \begin{array}{r}8\\ 4\\ \hline 32\end{array} \quad \begin{array}{r}9\\ 4\\ \hline 36\end{array}$$

What numbers should be put in the spaces?

5. 7 × 4 = ...28 ...2... 4's = 8 ...4... 6's = 24

6. 5 × 4 = ...20 ...7... 4's = 28 ...4... 9's = 36

7. 8 × 4 = ...32 ...3... 4's = 12 ...4... 4's = 16

8. Bill rides on the bus 4 times every school day. He pays 8¢ for each ride. How much does Bill pay to ride each day? 32¢

Multiply these numbers:

9.

$$\begin{array}{r}4\\ 4\\ \hline 16\end{array} \quad \begin{array}{r}5\\ 4\\ \hline 20\end{array} \quad \begin{array}{r}4\\ 6\\ \hline 24\end{array} \quad \begin{array}{r}4\\ 5\\ \hline 20\end{array} \quad \begin{array}{r}7\\ 4\\ \hline 28\end{array} \quad \begin{array}{r}4\\ 8\\ \hline 32\end{array} \quad \begin{array}{r}6\\ 4\\ \hline 24\end{array} \quad \begin{array}{r}4\\ 7\\ \hline 28\end{array} \quad \begin{array}{r}9\\ 4\\ \hline 36\end{array}$$

Let pupils prove reverses with objects or by addition. Reinforce reverses through quiz game, as, "What two facts have 20 as their product?" and so on.

Using the 4's

Multiply these numbers:

1.	4	9	4	8	4	3	4	4	0
	7	4	6	4	5	4	9	4	4
	28	36	24	32	20	12	36	16	0

2. Now do ex. 1 in a new way. Each time, after you multiply, add 2 to the product, like this: 7 × 4 = 28.(1) 28 + 2 = 30. Give only the answer, 30. Then do ex. 1 again, adding 3 to each product.(2) (1) 30, 38, 26, 34, 22, 14, 38, 18, 2; (2) 31, 39, 27, 35, 23, 15, 39, 19, 3

3. Problem Jack can make 180 tickets from 1 large sheet of cardboard. How many tickets can he make from 4 sheets? 720

Explanation Think, "4 × 0 = 0." Write 0 in the product.

Think, "4 × 8 = 32." Write 2 in the product and carry 3.

Think, "4 × 1 = 4. 4 + 3 (carried) = 7." Write 7 in the product. The answer is 720. Jack can make 720 tickets.

180
4
720

Multiply. Check by going over your work:

4.	12	61	124	$.85	$1.23	$2.19
	4	4	4	4	4	4
	48	244	496	$3.40	$4.92	$8.76
5.	70	38	206	$.43	$5.07	$1.90
	4	4	4	4	4	4
	280	152	824	$1.72	$20.28	$7.60
6.	39	48	104	$.87	$1.14	$4.15
	4	3	8	4	6	3
	156	144	832	$3.48	$6.84	$12.45

More Practice. See ⑬ on page 317. Use for individual assistance.

Have pupils discuss solutions to ex. 4–6 to see if difficulties are caused by basic facts or carrying. Stress order of multiplication (ones first), value of figures multiplied, and addition of carried number after multiplication.

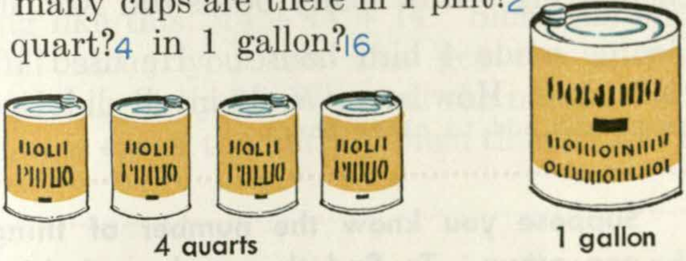
Reteach liquid measure by experimental method, using pint and quart bottles, one-gallon jug, measuring cup.

Pints, Quarts, and Gallons

1. Use a quart bottle and a gallon can for this exercise. Fill the quart bottle with water. Pour the water into the gallon can. Do this again and again until the gallon can is full of water. How many times did you pour water from the quart bottle into the gallon can? 4 How many quarts make 1 gallon? 4

2. How many pints are there in 1 quart? 2 Then how many pints are there in 1 gallon? 8

3. How many cups are there in 1 pint? 2 in 1 quart? 4 in 1 gallon? 16



4. Remember this:

Put on board as pupils perform experiments.

2 cups (c.) = 1 pint (pt.)
2 pints (pt.) = 1 quart (qt.)
4 quarts (qt.) = 1 gallon (gal.)

5. Learn the abbreviations in ex. 4. Add them to class chart (page 5).

Tell the number that belongs in each space:

6. 1 pt. = . 2 . c.

7. 3 pt. = . 6 . c.

8. 2 qt. = . 4 . pt.

9. 1 gal. = . 8 . pt.

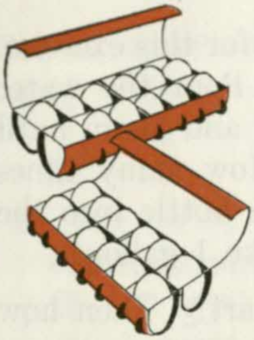
10. 2 gal. = . 8 . qt.

11. 4 gal. = . 16 . qt.

After completing this page, have pupils make charts showing table of measures, using words, abbreviations, and pictures of quantities. Post on bulletin board.

Teach two thought patterns in multiplication.

When to Multiply



1. Bill sold 2 doz. eggs to Mrs. Brown. How many eggs are there in 2 doz.? 24 The abbreviation for dozen is doz.

2. The children in 8 rooms of Park School sold tickets for a play. Each room had 40 tickets to sell. How many tickets were there all together? 320

3. Ann made 3 strings of beads. She put 75 beads on each string. How many beads did Ann use in all? 225

4. George made 4 bird houses. He used 16 nails in each one. How many nails in all did George use? 64

Emphasize and add to class chart.↘

Suppose you know the number of things in one group. To find the number of things in two or more groups of the same size, you should multiply.

5. Mother bought 4 yd. of cloth at $.75 a yard. How much did she pay for the cloth? $ 3.00

6. At $.35 each, how much do 4 tickets cost? $ 1.40

7. Find the cost of 4 books at $.89 each. $ 3.56

Emphasize.↘

Suppose you know the cost of one thing. To find the cost of two or more of these things, you should multiply.

Some pupils may use addition to find answers. Have pupils demonstrate, at blackboard, that multiplication is shorter way of finding answer. Have pupils make up problems for class to solve, using new thought patterns.

Do You Multiply or Add?

1. Susan sold 14 tickets on Monday, 15 tickets on Tuesday, and 18 tickets on Wednesday. How many tickets did she sell on these three days? 47

▶ Susan sold a different number of tickets each day. You add to find how many tickets in all she sold.

2. Bill sold 14 tickets on each of three days. How many tickets did he sell all together? 42

▶ In this problem Bill sold the same number of tickets each day. You can find the answer by adding like this: $14 + 14 + 14$. Since the numbers are all alike, you can also get the answer by multiplying 14 by 3. When all the numbers are the same, it is easier to multiply them than to add them.

Stress.

To find how many there are in all, you add when the numbers are not the same.

To find how many there are in all, you can multiply when the numbers are the same.

Tell whether you add or multiply. Then work the problem:

3. Tom earned 25¢ yesterday and 50¢ today. How much did he earn all together? Add; 75¢

4. Betty earns $.45 an hour. How much does she earn in 3 hours? Multiply; $1.35

5. Find the cost of 4 cans of dog food at 19¢ a can. Multiply; 76¢

6. Mother paid $1.60 for meat and $.85 for vegetables. How much did Mother spend all together? Add; $2.45

As on page 60, let pupils demonstrate that multiplication is shorter. Stress fact that groups must be equal. Ask pupils why they could not multiply in ex. 3 and 6.

Reteach coin equivalents and money value.

Nickel
5¢

Dime
10¢

Quarter
25¢

Half Dollar
50¢

Using Coins

Tell what numbers should be put in the spaces: Use toy money if necessary.

1. 2 dimes = .20.¢ 1 dime = .2. nickels
2. 6 dimes = .60.¢ 1 quarter = .25. cents
3. 9 dimes = .90.¢ 1 quarter = .5. nickels
4. 3 nickels = .15.¢ ½ dollar = .50. cents
5. 4 nickels = .20.¢ ½ dollar = .10. nickels
6. 2 quarters = .50.¢ ½ dollar = .5. dimes
7. 3 quarters = .75.¢ 1 dollar = .20. nickels
8. 1 dollar = .100.¢ 1 dollar = .10. dimes

9. How many quarters equal 1 dollar? 4

10. How many quarters equal 2 dollars? 8

11. Ann has 6 half dollars. How many dollars will Ann get if she changes her half dollars to dollars? 3 How many dollars are the same as 6 half dollars? 3

12. Tell what coins you need to make each of the following: 35¢ 60¢ 21¢ 29¢ 80¢

13. Do ex. 12 again and give different answers from those you gave before. Can you give six more sets of coins that each make 80¢?

Note use of fractions in ex. 4-6 to develop true meaning of ½ of a dollar. Develop "quarter" in same way. Let pupils make up money puzzles, as, "I have 5 coins worth 75¢. What are they?"

Can You Count Change?

1. Mary went to the store for her mother. She gave the man 1 dollar to pay for apples that cost 39¢. She counts the change to make sure it is right. Do you always count your change?

2. The man gave Mary 1 penny, 1 dime, and 1 half dollar. As he gave her these coins, one at a time, he said, "39, 40, 50, 1 dollar." He began with the cost of the apples, 39¢, and added enough to make 1 dollar.

3. Suppose the man had given Mary 1 penny, 1 dime, and 2 quarters. Tell what he might have said as he counted the change. 39, 40, 50, 75, $1.00

4. Jack had a half dollar. He spent 28¢ for a ticket to the movies. What coins did he get in change? 2 pennies and 2 dimes Tell what the girl said as she gave Jack these coins. 28 (or 28, 29) 30, 40, 50

5. Susan went to the store for Miss White. She spent 63¢ out of 1 dollar. As she gave Miss White the change, she counted it as the store man had done. Tell what Susan might have said. 63 (or 63, 64) 65, 75, $1.00

6. Andy gave the bus driver a quarter to pay for a 9-cent ride on the bus. What coins did the driver give Andy? Give two different answers. 1 penny, 1 nickel, 1 dime; 1 penny, 3 nickels

7. Show how the man would make change from $1.00 when the thing you buy costs: See G-28.

32¢ 70¢ 15¢ 8¢ 59¢ 27¢ 46¢

Do many oral exercises, using real or toy money, stressing facts that change making and checking are processes of successive additions, you begin at cost of purchase, smallest number of coins is used.

Present abstract problem-solving situations (let brighter pupils do most of this work).

Problems without Numbers

Tell whether you add, subtract, multiply, or divide to work each problem:

1. Patty knows how many cents she had in her pocket. She also knows how many pennies she has just found. How can Patty find how many cents she has in all? Add

2. Ben knows how much a book costs. He knows how much money he gave the man to pay for the book. How can he find how much change he should get? Subtract

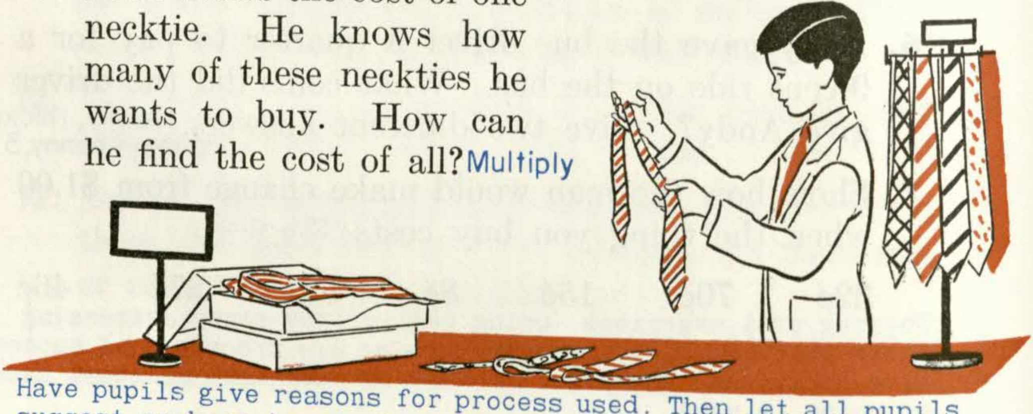
3. Mother knows how many children will be at Jane's party. She knows, too, how many sandwiches she will make for each child. How can Mother tell how many sandwiches to make all together? Multiply

4. Betty knows the cost of each thing she ate in the lunchroom. How can she find the cost of her lunch? Add

5. Tom knows how much a tent costs. He also knows how many boys will share the cost of the tent. How can he find each boy's share of the cost? Divide

6. Father knows how many miles it is from home to Green Lake. He has just seen a sign telling the number of miles he still has to go. How can he find the number of miles he has already gone? Subtract

7. Fred knows the cost of one necktie. He knows how many of these neckties he wants to buy. How can he find the cost of all? Multiply



Have pupils give reasons for process used. Then let all pupils suggest numbers to use to find a real answer.

Addition Practice

Begin at the bottom and add up. Check by adding down:

1.	134	463	143	207	382	635
	327	207	497	965	179	470
	985	290	316	546	265	219
	1446	960	956	1718	826	1324
2.	474	178	138	327	409	188
	276	285	693	569	561	395
	503	537	864	210	452	134
	1253	1000	1695	1106	1422	717

3.	2241	3164	5418	1279	5289
	2337	1325	3350	4644	1059
	4578	4489	8768	5923	6348

4. Jim bought a coat for $15.25 and a suit for $12.50. How much did he pay for both things? $27.75

5. Some boys sold 1325 pounds of old papers last month. This month they sold 1640 pounds. How many pounds in all did they sell? 2965

6. Add $12.44, $7.15, and $2.27. $21.86 — 346 + 907 1253

7. Add $16.61, $3.02, and $7.68. $27.31 — 795 + 469 1264

8. Add 1320, 2040, and 1228. 4588 — 580 + 673 1253

Add and check your work: Stress.

9.	1312	4202	1432	1436	1157
	3033	2351	4065	3441	1538
	2640	2346	2222	4015	6034
	6985	8899	7719	8892	8729

More Practice. See ⑭ on page 317.

To the Teacher. To avoid copying ex. 1 to 3 and 9 before adding the numbers, have pupils write the answers on folded paper as described on page 328. This plan may be used for subsequent exercises in addition and subtraction at the teacher's discretion.

Observe pupils as they work to note errors or hesitancy.
Determine if basic facts or process is causing difficulty.
Use "More Practice" pages for further review or reteaching.

Review Problems

First tell whether you add, subtract, multiply, or divide to get the answer. Then find the answer:

1. The girls in Ann's room at school are dressing 50 dolls to give away at Christmas. They have finished 28 dolls. How many more dolls are there to dress? Subtract; 22

2. Uncle Jim gave the 3 Hall children $15 to share equally. How much did each child get? Divide; $5

3. Susan bought crayons of 4 different colors. There were 6 blue, 9 red, 4 yellow, and 5 green. How many crayons did Susan buy all together? Add; 24

4. Joe bought 3 boxes of crayons. Each box held 12 crayons. How many crayons did Joe buy? Multiply; 36

5. Joe gave the man $1.00 to pay for the crayons. They cost $.45. How much change did Joe get? Tell two ways the man might have made the change. Subtract; $.55

6. Mother made 48 cookies. She gave half of them to the children to take on a picnic. How many cookies did Mother give the children? Divide; 24

7. Betty bought 4 yd. of ribbon at $.15 a yard. How much did she pay for the ribbon? Multiply; $.60

8. Bill has 15¢. If he buys ice cream for 8¢, how much will he have left? Subtract; 7¢

9. Jack had 174 stamps in his book. Today he bought 75 stamps. How many stamps has Jack now? Add; 249

Have pupils explain answers, giving reasons for process used. Pupils still having difficulty in recognizing thought patterns should be grouped for more work of this type. Let others work at arithmetic corner.

Develop understanding of use of parentheses and of associative principle for addition (ex. 6).

Using Parentheses

1. What does $(3 \times 4) + 2$ equal? The marks ( ) are called **parentheses.** When you need to multiply and to add in the same example, parentheses are often used to tell you which to do first. **Do the work inside the parentheses first.** In this example you first find 3×4, which gives 12. Then you add 12 and 2, which gives 14 for the answer.

2. How much is $3 + (4 \times 7)$? You first find 4×7, which gives 28. Then you add 3 and 28, which gives 31. How do parentheses help you in this example?

Give the answers:

3. $(4 \times 8) + 3$ 35 $3 + (4 \times 6)$ 27 $4 \times (3 + 5)$ 32

4. $(3 \times 7) + 2$ 23 $5 + (6 \times 2)$ 17 $2 \times (4 + 5)$ 18

5. $(8 \times 3) + 4$ 28 $1 + (4 \times 8)$ 33 $3 \times (2 + 6)$ 24

6. The example $3 + 5 + 4$ can be written these two ways using parentheses:

$(3 + 5) + 4$ 12 $3 + (5 + 4)$ 12

What is the answer for each of these? Do you need parentheses in this kind of example? Explain your answer.

7. Multiply each number by 4 and add 3:

2 11 7 31 4 19 8 35 0 3 6 27 9 39 3 15 5 23 1 7

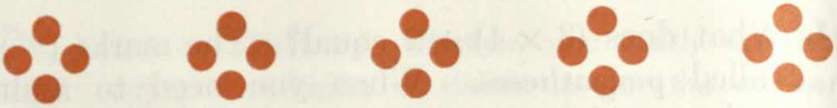
Write each of these examples using parentheses.

More Practice. See ㊳ on page 326.

Let different pupils act as teacher for ex. 3-5, 7. Urge pupils to respond quickly. Spot-check for class or individual weaknesses. Examples like ex. 3-5 are helpful for daily warm-up periods.

Review even division facts for 4's (pages 66-67).

How Many Equal Groups?



1. How many dots do you see above? 20 Count them by 4's. The dots are divided into groups with 4 dots in each group. How many groups are there? 5 How many 4's are there in 20? 5

2. On paper draw 16 dots. Draw lines to divide the dots into groups of 4 dots each. How many groups are there? 4 How many 4's are there in 16? 4

3. Alice uses the multiplication facts for 4 to help her divide. She thinks, "7 × 4 = 28, so there are seven 4's in 28." What does 28 ÷ 4 equal? 7

4. Bill says there are eight 4's in 32 because 8 × 4 = 32. Is Bill right? Yes How many are $4\overline{)32}$? 8

Tell what numbers should be put in the spaces:

5. 2 × 4 = 8, so there are .2. 4's in 8.

6. .9. × 4 = 36, so there are .9. 4's in 36.

7. .6. × 4 = 24, so there are .6. 4's in 24.

8. .4. × 4 = 16, so there are .4. 4's in 16.

Draw dots on paper if you need help with these problems:

9. At a party 24 children sat at small tables. There were 4 children at each table. How many tables were used at the party? 6

10. Father sold 32 qt. of milk today. How many gallons of milk is that? 8

Quickly review multiplication facts of 4's. Let slower pupils use materials and dot drawings to develop understanding of division facts. Have pupils prove facts using own multiplication tables.

The 4's Facts in Division

Tell what numbers should be put in the spaces:

1. . .2. 4's are 8 . .3. 4's are 12 . .6. 4's are 24

2. . .5. 4's are 20 . .9. 4's are 36 . .8. 4's are 32

3. . .7. 4's are 28 . .4. 4's are 16 . .5. 4's are 20

Tell the answers to these division facts:

4. 12 ÷ 4 3 32 ÷ 4 8 4 ÷ 4 1 16 ÷ 4 4

5. 36 ÷ 4 9 20 ÷ 4 5 8 ÷ 4 2 28 ÷ 4 7

6. 16 ÷ 4 4 28 ÷ 4 7 36 ÷ 4 9 24 ÷ 4 6

7. Remember these division facts: Make flash cards.

$\begin{array}{r}1\\4\overline{)4}\end{array}$ $\begin{array}{r}2\\4\overline{)8}\end{array}$ $\begin{array}{r}3\\4\overline{)12}\end{array}$ $\begin{array}{r}4\\4\overline{)16}\end{array}$ $\begin{array}{r}5\\4\overline{)20}\end{array}$

$\begin{array}{r}6\\4\overline{)24}\end{array}$ $\begin{array}{r}7\\4\overline{)28}\end{array}$ $\begin{array}{r}8\\4\overline{)32}\end{array}$ $\begin{array}{r}9\\4\overline{)36}\end{array}$

8. Each division fact in ex. 7 comes from a multiplication fact. For example, 12 ÷ 4 = 3 is the division fact that comes from 3 × 4 = 12. Tell the multiplication fact from which each division fact in ex. 7 comes.

9. Read these and give the answers:

$\begin{array}{r}8\\4\overline{)32}\end{array}$ $\begin{array}{r}5\\4\overline{)20}\end{array}$ $\begin{array}{r}3\\4\overline{)12}\end{array}$ $\begin{array}{r}2\\4\overline{)8}\end{array}$ $\begin{array}{r}9\\4\overline{)36}\end{array}$ $\begin{array}{r}4\\4\overline{)16}\end{array}$ $\begin{array}{r}1\\4\overline{)4}\end{array}$

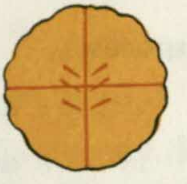
10. At 4¢ each, how many oranges can Mary buy for 20¢? 5 for 32¢? 8 for 24¢? 6 for 16¢? 4

11. Mother cooks 4 eggs for breakfast every morning. For how many breakfasts will 2 doz. eggs last? 6 How many eggs are there in 2 doz.? 24

Have pupils prove division facts in ex. 7 by subtraction. In ex. 4-7 and 9, have pupils express facts as: how many 4's in 12, 12 divided by 4, $4\overline{)12}$, there are three 4's in 12, 4 can be subtracted from 12 three times.

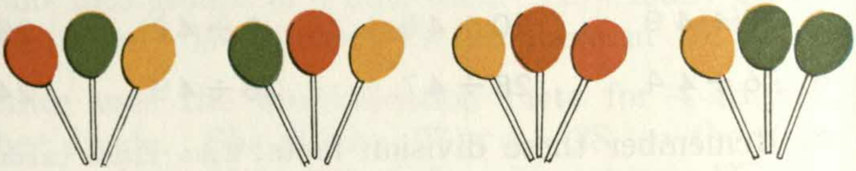
Teach how to find $\frac{1}{4}$ of a number.

One Fourth



1. Fred's mother made a berry pie. She cut it into 4 pieces all the same size, as shown at the left. Each piece is **one fourth** of the whole pie. Another name for one fourth is **one quarter.** You write one fourth like this: $\frac{1}{4}$. The whole pie is 4 fourths. This shows that $\frac{4}{4} = 1$.

2. Here are 12 lollipops divided into 4 equal groups.



Each group is $\frac{1}{4}$ of 12 lollipops. How many are $\frac{1}{4}$ of 12 lollipops? 3 How many are $\frac{1}{4}$ of 12? 3 How many are $12 \div 4$? 3 Does $12 \div 4$ have the same answer as $\frac{1}{4}$ of 12? Yes

Stress.

To find $\frac{1}{4}$ of a number, divide it by 4.

3. Use 20 play pennies for this. Hand them one at a time to 4 children. Count to 20 as you hand them out. How many pennies did each child get? 5 How many are $\frac{1}{4}$ of 20? 5 How many are $20 \div 4$? 5

4. Betty saves $\frac{1}{4}$ of all the money she earns. How much does Betty save when she earns \$4? \$1 when she earns \$12? \$3 when she earns \$20? \$5

5. How many are $\frac{1}{4}$ of 20 marbles? 5 of 28 marbles? 7

Use fractional parts on flannelboard to review $\frac{1}{4}$ of single object, stressing equality of the 4 parts. Then demonstrate $\frac{1}{4}$ of number through liberal use of objects, stressing above boxed statement. Have pupils show $\frac{1}{4}$ of other numbers with dot drawings.

Review zero division facts and use in exact division when zero appears in dividend (pages 69-70).

Using Zero in Division

1. Polly had 4 pencils. She shared them equally with her sister. How many pencils did Polly give her sister? 2 How many are 4 ÷ 2? 2

2. Polly has 0 pennies. 0 is called **zero,** and 0 pennies means **no** pennies, or **not any** pennies. If Polly shares 0 pennies with her sister, how many pennies will each one have? 0 How many are 0 ÷ 2? 0

3. You see that 0 ÷ 2 = 0. Another way to write 0 ÷ 2 = 0 is shown at the right. $\overset{0}{2\overline{)0}}$

4. How much is $\overset{0}{5\overline{)0}}$? $\overset{0}{9\overline{)0}}$? $\overset{0}{4\overline{)0}}$? $\overset{0}{7\overline{)0}}$? All of these answers are 0.

0 divided by any other number = 0.

5. **Problem** Aunt Mary had 160 pretty buttons. She gave them to the 4 Hill sisters. The girls shared them equally. How many buttons did each girl get? 40

Explanation Think, "16 ÷ 4 = 4." Write 4 over 6. Think, "0 ÷ 4 = 0." Write 0 over 0. The answer is 40. Each girl got 40 buttons. To check the work, multiply 40 by 4. $\overset{40}{4\overline{)160}}$

6. Fred got 60 eggs from his hens this week. He gave $\frac{1}{3}$ of them to his mother and sold the rest. How many eggs did Fred give his mother? 20

7. Betty paid 40¢ for 4 yd. of ribbon. Find the cost of 1 yd. of ribbon. 10¢

Develop generalization, boxed above, by discussing examples similar to ex. 2. In ex. 5 explanation, ask pupils why figure 4 in quotient is placed over 6, and why 0 is written in ones place.

Use pocket chart and bundles of sticks and single ones to demonstrate division, if needed.

Division Practice

Divide. Check your work by multiplying:

1. $\begin{array}{r}30\\4\overline{)120}\end{array}$ $\begin{array}{r}101\\4\overline{)404}\end{array}$ $\begin{array}{r}220\\4\overline{)880}\end{array}$ $\begin{array}{r}52\\4\overline{)208}\end{array}$ $\begin{array}{r}61\\4\overline{)244}\end{array}$

2. $\begin{array}{r}71\\4\overline{)284}\end{array}$ $\begin{array}{r}32\\4\overline{)128}\end{array}$ $\begin{array}{r}211\\4\overline{)844}\end{array}$ $\begin{array}{r}90\\4\overline{)360}\end{array}$ $\begin{array}{r}50\\4\overline{)200}\end{array}$

3. $\begin{array}{r}122\\4\overline{)488}\end{array}$ $\begin{array}{r}42\\4\overline{)168}\end{array}$ $\begin{array}{r}91\\4\overline{)364}\end{array}$ $\begin{array}{r}81\\4\overline{)324}\end{array}$ $\begin{array}{r}70\\4\overline{)280}\end{array}$

4. $\begin{array}{r}52\\3\overline{)156}\end{array}$ $\begin{array}{r}73\\2\overline{)146}\end{array}$ $\begin{array}{r}31\\4\overline{)124}\end{array}$ $\begin{array}{r}83\\3\overline{)249}\end{array}$ $\begin{array}{r}70\\3\overline{)210}\end{array}$

5. $\begin{array}{r}120\\2\overline{)240}\end{array}$ $\begin{array}{r}201\\2\overline{)402}\end{array}$ $\begin{array}{r}320\\3\overline{)960}\end{array}$ $\begin{array}{r}82\\4\overline{)328}\end{array}$ $\begin{array}{r}90\\2\overline{)180}\end{array}$

6. The children in 4 rooms at school have 400 play tickets to sell. Each room has the same number of tickets. How many tickets should the children in each room sell? 100

7. Two boys divided a bag of 120 marbles equally. How many marbles did each boy get? 60

8. Three busses carried 126 children to a big animal farm. The same number of children rode in each bus. How many children were in each bus? 42

Divide each number by 2.(1) Then divide each one by 4:(2)

9. $\overset{(1)\,10}{20}$ (2) 5 $\overset{40}{80}$ 20 $\overset{82}{164}$ 41 $\overset{102}{204}$ 51 $\overset{424}{848}$ 212 $\overset{124}{248}$ 62

10. $\overset{20}{40}$ 10 $\overset{44}{88}$ 22 $\overset{144}{288}$ 72 $\overset{240}{480}$ 120 $\overset{100}{200}$ 50 $\overset{220}{440}$ 110

11. $\overset{42}{84}$ 21 $\overset{14}{28}$ 7 $\overset{64}{128}$ 32 $\overset{122}{244}$ 61 $\overset{222}{444}$ 111 $\overset{420}{840}$ 210

Have pupils discuss answers to ex. 1-5. Have them explain placement of quotient figures (dividing hundreds gives hundreds, tens gives tens, and so on) and why zero is needed in quotient (place-holding nature).

Provide practice in subtraction and multiplication.

Problems and Practice

1. There are 310 children in the Hill School. All but 15 of them went to the school field day. How many children went there? 295

2. Peter sold 384 papers last week. So far this week he has sold 268 papers. How many more papers must he sell to do as well as last week? 116

3. Susan had \$5.00. She bought a new hat for \$1.98. How much of the \$5.00 did she have left? \$3.02

Subtract and check your work: Stress checking.

4.	828	493	641	2889	3766	4987
	647	157	453	2264	2363	3742
	181	336	188	625	1403	1245
5.	177	500	799	1080	1455	1507
	97	426	583	345	825	541
	80	74	216	735	630	966

6. Our school sold 225 tickets for the school play each time it was given. The play was given 3 times. How many tickets in all were sold? 675

7. Tickets to the ball game cost \$.75 each. Find the cost of 4 tickets. \$3.00

Multiply. Check your work by going over it: Stress.

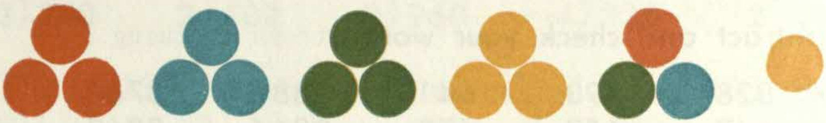
8.	322	216	172	\$1.05	\$3.49	\$2.19
	4	4	3	4	2	4
	1288	864	516	\$4.20	\$6.98	\$8.76
9.	121	308	604	\$1.28	\$3.18	\$1.30
	6	3	4	2	4	5
	726	924	2416	\$2.56	\$12.72	\$6.50
10.	407	192	140	\$2.74	\$2.14	\$2.01
	4	4	3	2	7	8
	1628	768	420	\$5.48	\$14.98	\$16.08

Have pupils who show hesitancy explain solutions at board. Note if facts or processes cause difficulty. Plan for drill or reteaching.

Teach uneven division facts with divisors of 2, 3, and 4 (pages 72–74). Review even facts first.

Making Equal Groups

1. Betty cut out 16 circles from colored paper. She laid them on white paper in equal groups with 4 circles in each group. How many equal groups did she have? 4 You see that she used all 16 circles in the equal groups above.



2. Then Betty tried putting the 16 circles in groups with 3 circles in each group. This time she had 1 circle left over. You see that when 16 is divided by 3 there is 1 left over. How many equal groups did Betty have? 5

3. Draw 20 dots on paper. Then draw lines to mark them off into equal groups with 4 dots in each group. How many equal groups are there? 5 Are any dots left over? No Now draw 20 more dots on paper. Mark them off into equal groups with 3 dots in each group. How many equal groups are there? 6 Are any dots left over? Yes, 2

4. Draw 3 sets of 14 dots. On the first set mark off equal groups with 2 dots in each group. On the second set mark off equal groups with 3 dots in each group. On the third set mark off equal groups with 4 dots in each group. Are any dots left over in any of these sets of 14 dots? Yes: second set, 2 dots; third set, 2 dots

Have pupils use objects (beads, straws) first to illustrate some uneven division facts ($3\overline{)7}$, $2\overline{)9}$). Then do ex. 1–4, using dot drawings. Make up problems with uneven facts; have pupils use materials and dot drawings to show answers.

Acquaint pupils with terms dividend, divisor, quotient, remainder. Add to vocabulary chart and use hereafter.

How Many Stamps Can Ann Get?

1. Ann has 14 pennies. She wants to buy 4-cent stamps. How many can she get for 14¢? 3 To find out Ann lays out her 14 pennies in groups of 4, like this:

Ann has 3 groups and 2 pennies are left over. Ann knows she can buy 3 stamps and have 2 pennies left.

2. Ann can do this problem without laying out the 14 pennies in groups of 4 each. She thinks, "Three 4's are 12, and 2 **more** make 14, so 2 are left. There are not four 4's because four 4's make 16."

3. This is the way Ann writes the work: Since there are three 4's in 14, she writes 3 above 14. Then she multiplies 4 by 3, which gives 12. She writes 12 under 14 and subtracts. This gives 2. So 2 is left over. 2 is called the **remainder;** 3 is called the **quotient.**

$$\begin{array}{r} 3 \\ 4\overline{)\,14} \\ 12 \\ \hline 2 \end{array}$$

4. Jack has 19¢. How many cookies can he buy at 3¢ each? 6 How many 3's are there in 19? 6 How many pennies will Jack have left? 1

5. Study these examples: Have pupils explain these orally.

$$\begin{array}{r} 7 \\ 4\overline{)\,29} \\ 28 \\ \hline 1 \end{array} \qquad \begin{array}{r} 5 \\ 3\overline{)\,17} \\ 15 \\ \hline 2 \end{array} \qquad \begin{array}{r} 8 \\ 3\overline{)\,25} \\ 24 \\ \hline 1 \end{array} \qquad \begin{array}{r} 6 \\ 2\overline{)\,13} \\ 12 \\ \hline 1 \end{array} \qquad \begin{array}{r} 9 \\ 4\overline{)\,37} \\ 36 \\ \hline 1 \end{array}$$

Let pupils use objects in ex. 1. Then explain ex. 2–3 carefully. Stress proper placement of quotient. Explain that we multiply to check that there are four 3's in 14, and subtract to find the remainder. Let pupils check ex. 4–5 with dot drawings.

On number lines, have pupils circle numbers (helping numbers) that can be divided evenly by 2, 3, or 4.

How Many Are Left Over?

1. **Problem** Four boys bought 35 stamps in a package. They shared the stamps equally. How many stamps did each boy get? 8 How many were left over? 3

Explanation In this problem you may write the answer like this: 8 R3. R means **remainder.** This shows that each boy got 8 stamps and that 3 stamps were left over. The quotient is 8 and the remainder is 3.

$$\begin{array}{r} 8\text{ R3} \\ 4\overline{)35} \\ \underline{32} \\ 3 \end{array}$$

Find the quotients and the remainders. Do the work and write each answer as shown in ex. 1:

2. $\overset{1R3}{4\overline{)7}}$ $\overset{7R1}{3\overline{)22}}$ $\overset{9R1}{2\overline{)19}}$ $\overset{6R3}{4\overline{)27}}$ $\overset{8R1}{4\overline{)33}}$ $\overset{9R1}{3\overline{)28}}$

3. $\overset{2R2}{3\overline{)8}}$ $\overset{2R3}{4\overline{)11}}$ $\overset{5R1}{2\overline{)11}}$ $\overset{4R2}{4\overline{)18}}$ $\overset{7R3}{4\overline{)31}}$ $\overset{5R1}{3\overline{)16}}$

4. $\overset{1R1}{4\overline{)5}}$ $\overset{3R1}{3\overline{)10}}$ $\overset{5R3}{4\overline{)23}}$ $\overset{8R2}{4\overline{)34}}$ $\overset{8R1}{2\overline{)17}}$ $\overset{9R1}{4\overline{)37}}$

5. $\overset{4R1}{2\overline{)9}}$ $\overset{7R1}{2\overline{)15}}$ $\overset{8R1}{3\overline{)25}}$ $\overset{3R1}{4\overline{)13}}$ $\overset{9R2}{4\overline{)38}}$ $\overset{6R2}{3\overline{)20}}$

Tell what numbers go in the spaces: Give other exercises like ex. 6–9; prove with dot drawings.

6. In 7 there are . 3 . 2's and . 1 . left over.

7. In 7 there are . 2 . 3's and . 1 . left over.

8. In 9 there are . 2 . 4's and . 1 . left over.

9. In 13 there are . 4 . 3's and . 1 . left over.

10. Susan cut out 30 pieces of yellow paper to make paper flowers. She used 4 pieces for each flower. How many flowers did Susan make? 7 How many pieces were left over? 2

Have pupils explain ex. 2–5 orally to check understanding of process. Some pupils may find helping numbers useful. In ex. 1, helping number is 32 (next smaller number that can be divided evenly by 4).

Teach two division problem patterns using partition and measuring concepts (see G–31, 32).

When to Divide

Add partition pattern to class chart.

Suppose you know how many there are in all. You also know how many groups you have (or can make). To find how many are in each group, you should divide.

1. Mother made 36 cupcakes. She put them in 3 packages. How many cupcakes are there in each package? 12
2. Betty cut out 10 pictures of flowers. She put the same number of flowers in 2 books. How many pictures did Betty put in each book? 5
3. There are 40 children who will dance at the school fair. The children will dance in 4 circles. How many children will there be in each circle? 10

Add measuring pattern to chart.

Suppose you know how much money you can spend for several of the same things. You also know the price of one thing. To find how many of these things you can buy, you should divide.

4. Jack spent 20¢ for pencils at 4¢ each. How many pencils did Jack get? 5
5. Susan has 12¢ to spend for lollipops at 2¢ each. How many lollipops can Susan buy? 6
6. Mary has a quarter. How many 3-cent candies can she buy? 8 How much money will she have left? 1¢

Pupils should be able to recognize difference between the two concepts, but do not need to know the terms. Have pupils make up other problems, illustrating these patterns.

More about Division

1. **Problem** Three boys shared 72 marbles equally. How many marbles did each boy get? 24

Explanation You must divide 72 by 3. You find the first quotient figure like this:

$$\begin{array}{r} 24 \\ 3\overline{)72} \\ \underline{6} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

(1) **Divide** the tens first. Think, "7 tens ÷ 3 = 2 tens with 1 over." Write 2 tens over 7 tens.

(2) **Multiply** 3 by 2. This gives 6. Write 6 under 7.

(3) **Subtract** 6 from 7. This leaves 1. Write 1 under 6. 1 is the remainder.

Emphasize. (4) **Compare** the remainder 1 with 3. The remainder must be smaller than the number you divide by. The remainder 1 is smaller than 3.

(5) **Bring down** the 2 ones of 72 and write 2 after the 1 ten. This makes 12 ones.

You find the second quotient figure like this:

(1) **Divide** 12 ones by 3. This gives 4 ones. Write 4 over the 2 of 72.

(2) **Multiply** 3 by 4. This gives 12. Write 12 under 12.

(3) **Subtract** 12 from 12. This gives a remainder of 0.

Emphasize. (4) **Compare** the remainder 0 with 3. 0 is less than 3.

(5) **Bring down.** There is no other figure to bring down, so the work is finished.

The quotient is 24. Each boy got 24 marbles. Check the work by multiplying 24 by 3.

Point out that there are 5 steps involved in finding "each" quotient figure. In explanation, stress place value of quotient and dividend figures. Be sure pupils understand why 6 is put under 7 (tens place) and that the 1 left, after subtracting 6 from 7, is 1 ten.

Have pupils explain work orally, giving reasons for placement of figures.

More about Division

1. Look at the work on page 76. You see that there are 5 steps in finding each quotient figure. These steps are: (1) Divide, (2) Multiply, (3) Subtract, (4) Compare, (5) Bring down.

2. Study these division examples carefully. Name each step as you go over the work:

$$\begin{array}{r} 23 \\ 4\overline{)92} \\ \underline{8} \\ 12 \\ \underline{12} \end{array} \qquad \begin{array}{r} 26 \\ 3\overline{)78} \\ \underline{6} \\ 18 \\ \underline{18} \end{array} \qquad \begin{array}{r} 49 \\ 2\overline{)98} \\ \underline{8} \\ 18 \\ \underline{18} \end{array} \qquad \begin{array}{r} 28 \\ 3\overline{)84} \\ \underline{6} \\ 24 \\ \underline{24} \end{array}$$

Divide. Check your work by multiplying: Emphasize.

3. $\begin{array}{r}19\\4\overline{)76}\end{array}$ $\begin{array}{r}18\\2\overline{)36}\end{array}$ $\begin{array}{r}15\\3\overline{)45}\end{array}$ $\begin{array}{r}46\\2\overline{)92}\end{array}$ $\begin{array}{r}29\\3\overline{)87}\end{array}$ $\begin{array}{r}18\\3\overline{)54}\end{array}$

4. $\begin{array}{r}28\\2\overline{)56}\end{array}$ $\begin{array}{r}27\\3\overline{)81}\end{array}$ $\begin{array}{r}13\\4\overline{)52}\end{array}$ $\begin{array}{r}17\\3\overline{)51}\end{array}$ $\begin{array}{r}15\\4\overline{)60}\end{array}$ $\begin{array}{r}19\\2\overline{)38}\end{array}$

5. $\begin{array}{r}47\\2\overline{)94}\end{array}$ $\begin{array}{r}16\\4\overline{)64}\end{array}$ $\begin{array}{r}37\\2\overline{)74}\end{array}$ $\begin{array}{r}24\\4\overline{)96}\end{array}$ $\begin{array}{r}39\\2\overline{)78}\end{array}$ $\begin{array}{r}16\\3\overline{)48}\end{array}$

6. $\begin{array}{r}14\\3\overline{)42}\end{array}$ $\begin{array}{r}38\\2\overline{)76}\end{array}$ $\begin{array}{r}18\\4\overline{)72}\end{array}$ $\begin{array}{r}25\\3\overline{)75}\end{array}$ $\begin{array}{r}29\\2\overline{)58}\end{array}$ $\begin{array}{r}17\\4\overline{)68}\end{array}$

7. Bill got 32 eggs from his hens today. He gave his mother $\frac{1}{2}$ of them. How many eggs did Bill give his mother? 16

8. Mother bought 2 yd. of ribbon for 90¢. Find the cost of 1 yd. of the ribbon. 45¢

9. Find $\frac{1}{2}$ of 50¢; 25¢ of 96¢. 48¢

More Practice. See ⑮ on page 318.

Again, stress the 5 steps, in particular the comparison step. Point out that if remainder (in this step) is larger than, or equal to, divisor, quotient figure is wrong.

If needed, use materials to show division and exchange of hundreds for tens.

Remainders in Division

1. Problem Four girls bought 150 Christmas cards. They divided the cards equally. How many cards did each girl get? 37 Were any cards left over? 2

Explanation Divide 150 by 4 as shown here. Since you cannot divide 1 by 4, divide 15 by 4. This gives 3 as the first figure of the quotient. Write 3 over the last figure of 15 because you divided 15 by 4. Explain the rest of the work.

$$\begin{array}{r} 37 \\ 4\overline{)150} \\ \underline{12} \\ 30 \\ \underline{28} \\ 2 \end{array}$$

In the last part of the work you subtract 28 from 30 and have 2 left. 2 is the **remainder.** The **quotient** is 37. Each girl got 37 cards and 2 cards were left over.

Check the work by multiplying 37 by 4. This gives 148. Then add the remainder 2. The sum is 150. Since 150 is the same as the number being divided, the work is right.

Check

$$\begin{array}{r} 37 \\ \underline{4} \\ 148 \\ \underline{2} \\ 150 \end{array}$$

Divide and check your work: Stress checking.

2.	37R3 4)151	34R2 3)104	45R1 3)136	59R1 2)119	59R3 4)239
3.	56R2 3)170	43R1 4)173	98R1 2)197	26R3 4)107	86R2 3)260

More Practice. See ⑯ on page 318. Use to reinforce skill.

Stress place value in explanation. Be sure pupils understand that 15 is 15 tens (1 hundred and 5 tens). Ask pupils why 3 in quotient is in tens place (tens were divided). Have pupils tell place value of remaining figures.

Review column addition.

Problems and Practice

1. Jack took his dog to the children's pet show. Eight children guessed how much the dog weighed. Here are their guesses:

HOW MUCH DO I WEIGH?

Child	Guess in Pounds	Child	Guess in Pounds
Mary	66	Jim	140
Peter	86	Ann	153
Susan	107	Andy	180
Jane	122	Betty	200

Jack's dog really weighed 132 pounds. Tell whose guess was the nearest. Jim's guess

2. Which one of the 8 guesses was the poorest? Betty's guess

Add these numbers and check your work:

3.	12	45	44	22	27	54	46
	51	24	20	13	42	80	31
	12	63	35	31	14	33	30
	24	21	14	54	62	73	45
	99	153	113	120	145	240	152
4.	96	39	54	67	69	35	80
	75	74	63	39	59	75	58
	65	82	78	61	48	89	77
	67	33	62	33	85	57	49
	303	228	257	200	261	256	264

5.	4400	2343	2206	4030	5403
	2437	1424	1473	3159	3405
	6837	3767	3679	7189	8808
6.	4753	5465	1466	1798	2217
	4243	1433	2522	1101	4652
	8996	6898	3988	2899	6869

7. Subtract 219 from 330; 111 from 409; 190 from 800. 581

Use folded-paper method described on page 328. Have pupils who hesitate explain work orally. Determine if facts, adding by endings, or carrying is causing difficulty. Drill or reteach accordingly.

Review problem solving using pupils' experiences.

A Halloween Party

1. On October 10 Mary asked the children, "Do you know when Halloween comes?" Bill answered, "Halloween always comes on October 31." Look at a calendar to find on what day of the week Halloween comes this year. Also find how many weeks it is from October 10 to October 31. 3 weeks

2. The children had 3 weeks to make things for a Halloween party. Some children cut out black cats from heavy black paper. They could get 4 cats from each sheet of paper. How many could they get from 9 sheets? 36

3. Other children made pointed hats from orange paper. They made 2 hats from each sheet of paper. How many hats did they get from 8 sheets of paper? 16

4. Some of the boys had pumpkins in their gardens. They brought 8 large pumpkins and 15 small ones for the party. How many pumpkins in all did they bring? 23

Remind pupils to read problems carefully to determine what the problem asks them to find, what facts are known, what process to use, how to write problem in numbers.

5. The children are planning for 43 people to be at the party. There will be 38 children and the rest will be teachers. How many teachers will there be? 5

6. Paper plates, paper cups, and paper napkins will be used at the party. Cups and plates are sold by the dozen. Will 3 doz. of each be enough for 43 people, or do they need 4 doz.?(1) The napkins come in packages of 60 each. How many packages will be needed?(2) (1) They need 4 doz.; (2) 1

7. The girls will make 120 sandwiches for the party. Half of them will be egg sandwiches. The other half will be meat sandwiches. How many sandwiches of each kind will there be? 60

8. The children have ordered 6 doz. cupcakes at the bakery. How many is that? 72 Half of them will be orange. How many orange cakes will there be? 36

9. The children will find the cost of the party. They must add numbers like those below. You add them:

$.15	$1.49	$.35	$.99	$2.37	$1.45
.48	.83	.45	.67	1.09	1.85
.27	1.25	.82	.37	1.62	1.36
$.90	$3.57	$1.62	$2.03	$5.08	$4.66

More Practice. See ⑰ on page 318.

Use "More Practice" pages if pupils have difficulty in ex. 9. Remind pupils that cents are added first, then dimes, then dollars. Review meaning of decimal point.

Present two new problem patterns in division.

When to Divide

1. On a trip to Blue Lake, 110 children will ride in 2 busses. The same number will ride in each bus. How many children should ride in each bus? 55
2. The boys are placing 24 chairs in rows for a television show. If they make 4 equal rows, how many chairs will there be in each row? 6 If they make 3 equal rows, how many chairs will there be in each row? 8 If they make 2 equal rows, how many? 12
3. Mother made 75 cookies. She packed 4 boxes, with the same number of cookies in each one. How many cookies did she put in each box? 18 How many cookies were left over? 3
4. Aunt Susan divided 130 buttons equally between Ann and Sally. How many did each girl get? 65
5. There are 300 tickets to sell for a travel movie at school. Four rooms will divide the tickets equally. How many tickets will each room have? 75
6. Mary and Peggy earned 90¢ wheeling Mrs. White's baby. They shared the money equally. How much did each girl get? 45¢

Emphasize. ↓

Suppose you wish to put things into several equal groups. To find how many there will be in each group, you should divide.

Suppose things are to be shared equally by several children. To find each child's share, you should divide.

Both patterns illustrate partition concept of division. Have pupils make up other problems, using these patterns. Post on bulletin board for further reference. Add new patterns to class chart (page 6).

Roman Numerals

1. There are 4 books in the set shown at the right. Each book is numbered. What kind of numerals do you see on these books? Roman

2. Here the first twelve numbers are written using Roman numerals. Write them without looking at your book:

I II III IV V VI VII VIII IX X XI XII

3. Draw a clock face and put Roman numerals on it. Draw the hands to show 4 o'clock.

Four Ten Six Nine Seven Eleven

4. Read these numerals: IV, X, VI, IX, VII, XI.

II V VI III VIII XII

5. Write in Roman numerals: 2, 5, 6, 3, 8, 12.

Do You Know the Right Word?

Review some vocabulary words by completion test.

Give the right word for each space. On your paper try to write the word:

6. To share things equally means to . . . equally. divide

7. Product is the name of the answer in . . . multiplication.

8. A gallon of ice cream is equal to 4 . . . of it. quarts

9. The money you get back when you give 50¢ to pay for a 15-cent ball is the . . . change.

10. Four coins that together equal a half dollar are one . . ., two . . ., and one . . . quarter dimes nickel.

11. To find the cost of two or more things at the same price, you . . . multiply.

Some pupils might like to investigate uses of Roman numerals today, and report findings to class. Use ex. 6-11 to check pupils' arithmetic vocabulary. Extend to include other terms.

Review division work taught in Chapter 2.

Problems and Practice

Divide and check your work:

1. $\overset{79}{4\overline{)316}}$ $\overset{96}{2\overline{)192}}$ $\overset{65R1}{4\overline{)261}}$ $\overset{94}{3\overline{)282}}$ $\overset{83}{4\overline{)332}}$

2. $\overset{38}{3\overline{)114}}$ $\overset{47R3}{4\overline{)191}}$ $\overset{58}{4\overline{)232}}$ $\overset{97R1}{2\overline{)195}}$ $\overset{76R2}{3\overline{)230}}$

3. $\overset{96}{4\overline{)384}}$ $\overset{75R1}{2\overline{)151}}$ $\overset{54R2}{4\overline{)218}}$ $\overset{45}{3\overline{)135}}$ $\overset{39}{4\overline{)156}}$

4. Betty earned \$58 during the summer. She put ½ of this money in the bank. How many dollars did Betty put in the bank? \$29

5. Three boys printed 285 tickets for a school play. Each one printed one third of the tickets. How many tickets did each boy print? 95

6. Four girls shared equally a package of drawing paper. There were 144 sheets of paper in it. How many sheets of paper did each girl get? 36

Divide each number by 4.(1) Then divide each by 3:(2)

7. $\overset{(1)\ 19}{76}$ (2)25R1 $\overset{44R3}{179}$ 59R2 $\overset{59R3}{239}$ 79R2 $\overset{43R3}{175}$ 58R1 $\overset{64}{256}$ 85R1 $\overset{49R2}{198}$ 66

8. $\overset{13R2}{54}$ 18 $\overset{62R2}{250}$ 83R1 $\overset{29R2}{118}$ 39R1 $\overset{34}{136}$ 45R1 $\overset{47R2}{190}$ 63R1 $\overset{63R1}{253}$ 84R1

9. $\overset{4R3}{19}$ 6R1 $\overset{57R3}{231}$ 77 $\overset{66R3}{267}$ 89 $\overset{26R2}{106}$ 35R1 $\overset{59R2}{238}$ 79R1 $\overset{55R1}{221}$ 73R2

10. $\overset{14R3}{59}$ 19R2 $\overset{57R1}{229}$ 76R1 $\overset{42R2}{170}$ 56R2 $\overset{28R1}{113}$ 37R2 $\overset{65}{260}$ 86R2 $\overset{27R1}{109}$ 36R1

11. $\overset{17R2}{70}$ 23R1 $\overset{49}{196}$ 65R1 $\overset{33}{132}$ 44 $\overset{56R1}{225}$ 75 $\overset{29}{116}$ 38R2 $\overset{36R3}{147}$ 49

12. $\overset{14}{56}$ 18R2 $\overset{35R1}{141}$ 47 $\overset{43R1}{173}$ 57R2 $\overset{58}{232}$ 77R1 $\overset{55}{220}$ 73R1 $\overset{66R1}{265}$ 88R1

13. How many 4's are there in 376? 94 in 348? 87

14. What is the remainder when you divide 280 by 3? 1

15. What is the remainder when you divide 335 by 4? 3

Give a quick review of uneven division facts of 2, 3, and 4 before starting this page. Note errors and hesitancy on progress cards. Group pupils for drill or reteaching. Stress the 5 steps involved and place value of figures.

Review some terms and test division understandings.

Right or Wrong?

Read each exercise. Then tell whether it is right or wrong by saying "Yes" or "No":

1. The product of 4 and 7 is 28. Yes

2. There are 2 quarts in $\frac{1}{2}$ gallon. Yes

3. There are 36 inches in 1 foot. No

4. A dollar is less than 9 dimes. No

5. 9:38 means 22 minutes before 10. Yes

6. There are 30 minutes in $\frac{1}{4}$ hour. No

7. $\frac{1}{2}$ of 16¢ is more than $\frac{1}{4}$ of 16¢. Yes

8. Susan ate her breakfast at 7 P.M. today. No

9. Two weeks from December 9 is December 30. No

10. Bill can buy six 4-cent pencils with a quarter. Yes

11. The cost of 8 lollipops at 3¢ each is 38¢. No

12. When 17 is divided by 3 the remainder is 2. Yes

13. Seven dimes are more than a half dollar. Yes

14. Three quarters are less than nine dimes. Yes

15. At 3:05 the long hand of the clock points to 1 and the short hand points to 3. Yes

16. Bill had a quarter. He spent 15¢ and had 3 nickels left. No

17. Ann practiced from 3:20 P.M. to 3:45 P.M. She practiced a half hour. No

18. Andy shared 30 stamps with 2 other boys. You divide to find out how many stamps each boy got. Yes

Spot-check class for areas of weakness. Plan for further review. Have pupils give reasons for answers to discourage guessing.

See G-34 for correlation of examples with aims.

Chapter Review

1. Beginning with 4, count by 4's to 40. 4,8,12,16,20,24,28,32,36,40

2. How many gallons are there in 12 qt.? 3

3. What will ¼ doz. oranges cost at 48¢ a dozen? 12¢

4. How many different coins are there that are smaller than 1 dollar? Five

5. How much money have you if you have 1 coin of each kind in ex. 4? 91¢

6. Count the change from $1.00 for things that cost 80¢; (1) 35¢; (2) 61¢; (3) 25¢; (4) 46¢; (5) 77¢. (6) (1) 80,90,$1 00;(2) 35,40,50,$1 00;(3) 61,65,75,$1 00;(4) 25,50,$1 00;(5) 46,50,$1 00;(6) 77,80,90,$1 00

7. How many hours are there between 8 A.M. and 8 P.M.? Twelve between 9 A.M. and 4 P.M.? Seven

8. How many minutes are there between 11:15 A.M. and 11:28 A.M.? (1) between 11:45 A.M. and 12:20 P.M.? (2) Look at a clock to find the answers. (1) Thirteen minutes; (2) Thirty-five minutes

9. How many cookies at 3¢ each can you buy for a quarter? 8 Will you have any money left over? Yes, 1¢

10. Find the sum of $4.68, $.97, and $5.25. $10.90

11. Subtract 195 from 300; 105 subtract 386 from 1240. 854

12. Write the largest 4-place number you can. 9999

Multiply and check: Be sure pupils check ex. 13–14.

13.

216	290	140	$1.51	$1.04
4	4	8	4	7
864	1160	1120	$6.04	$7.28

Divide and check:

14. $\overset{22}{4\overline{)88}}$ $\overset{98}{4\overline{)392}}$ $\overset{27}{4\overline{)108}}$ $\overset{56}{4\overline{)224}}$ $\overset{74\text{ R3}}{4\overline{)299}}$

Note individual errors or hesitancy on progress cards. Use results of review as guide to need for further class or individual review. Let pupils who have no difficulties work at arithmetic corner.

A Problem Test

1. The children in Park School made $140 at the school fair. They gave $\frac{1}{4}$ of it to the school library. How much did the library get? $ 35

2. In his pocket Dick had 3 dimes and 2 quarters. How much money did Dick have in his pocket? 80¢

3. Suppose Dick, in ex. 2, spends 72¢. How much change will he get? 8¢ Count the change as you would if you were giving it to Dick. 72,75,80

4. Mother bought 4 yd. of cloth at $.89 a yard. How much did all the cloth cost? $3.56

5. Patty went to the store with $5.00. When she came home she had $1.07. How much had she spent? $3.93

6. For the school party we need 52 quarts of ice cream. It costs less to buy ice cream by the gallon than by the quart. How many gallons do we need? 13

7. Jim wants to buy a basket, a light, and a horn for his old bicycle. He needs $1.49, $1.55, and $.95. How much does Jim need all together? $3.99

8. Alice is making 4 picture books. She needs 16 sheets of heavy paper for each one. How many sheets of paper does Alice need all together? 64

9. How many 4-cent lollipops can Bob buy for 15¢? 3 Will he have any money left over? Yes If so, how much? 3¢

10. In a game Joe's scores were 4, 8, 7, and 8. What was Joe's score at the end of the game? 27

This is the second Problem Test. How many problems did you have right? Each problem counts 10.

If pupils evidence difficulties, have them talk out solutions to determine if thought patterns, processes, or basic facts are the causes. Give individual help accordingly.

Present diagnostic test and practice pages.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Pages for that row.

Add these numbers and check the work:

						Practice Pages
1.	785 322 227 1334	397 149 424 970	165 636 442 1243	319 144 537 1000	172 112 636 920	63, 79

Subtract and check the work:

2.	9796 4214 5582	5798 4434 1364	7776 3626 4150	2993 2992 1	71
3.	1877 957 920	1475 627 848	1660 822 838	1564 870 694	71

Multiply and check the work:

4.	96 4 384	37 4 148	180 4 720	$1.52 4 $6.08	$3.24 4 $12.96	56, 71
5.	104 8 832	241 5 1205	209 4 836	$1.40 7 $9.80	$1.14 6 $6.84	56, 71

Divide these numbers and check:

6.	21 3)63	20 4)80	81 4)324	80 2)160	102 4)408	70
7.	6R1 2)13	9R1 4)37	7R2 3)23	2R3 4)11	5R2 4)22	74
8.	24 4)96	39 2)78	14 4)56	28 3)84	17 4)68	77
9.	68 3)204	63 4)252	84 4)336	75 4)300	57 2)114	78

Compare results of test with previous ones (pages 84, 86) as noted on progress cards. Urge pupils to make self-assignments from practice pages.

See G-36 for specific aims of Chapter 3.

Chapter 3

Buying Picture Post Cards

Develop readiness for multiplication facts of 5's.

1. Bill and Sally are buying picture post cards to send to friends. If Bill buys 3 cards at 5¢ each, how much will they cost? 15¢ How many are 3×5¢? 15¢ How many are three 5's? 15
2. Sally chooses 4 cards. How much must she pay for them? 20¢ How many are 4×5¢? 20¢ How many are four 5's? 20
3. Suppose Bill buys 5 cards. He says, "I know that five 5's are 25 because five nickels are the same as 25¢. This shows that $5 \times 5 = 25$."
4. How many are 6×5? 30 Sally says, "I know that five 5's are 25, so six 5's are 5 more than 25, or 30."
5. Think as Sally does to find the answer to 7×5. How many are 8×5? 9×5? See G-36.
6. Count by 5's from 5 to 50. 5,10,15,20,25,30,35,40,45,50 Counting by 5's helps you find the answers to multiplication facts with 5's.

Do this page as it is written. If some pupils have difficulty, let them use toy money or objects to discover facts. Use a number chart to lead pupils to generalize that products end in 0 or 5.

Teach multiplication facts of 5's.

The 5's in Multiplication

1. Four 5's are ...20, so five 5's are 5 more than ...20, or ...25 Five 5's are ...25

2. Five 5's are ...25, so six 5's are 5 more than ...25, or ...30 Six 5's are ...30

3. Six 5's are ...30, so seven 5's are 5 more than ...30, or ...35 Seven 5's are ...35

4. Seven 5's are ...35, so eight 5's are 5 more than ...35, or ...40 Eight 5's are ...40

5. Eight 5's are ...40, so nine 5's are 5 more than ...40, or ...45 Nine 5's are ...45

6. Learn these multiplication facts for the 5's: Make flash cards.

5	5	5	5	5	5	5	5	5	5
0	1	2	3	4	5	6	7	8	9
0	5	10	15	20	25	30	35	40	45

7. How many are nine 5's? 45 six 5's? 30 eight 5's? 40 three 5's? 15 five 5's? 25 seven 5's? 35

8. How many are 4 × 5? 20 2 × 5? 10 7 × 5? 35 1 × 5? 5

9. A nickel equals 5¢. How many cents equal six nickels? 30¢ 9 nickels? 45¢ 4 nickels? 20¢ 8 nickels? 40¢

10. Jim has 9 piles of pennies with 5 pennies in each pile. How many pennies has Jim? 45

Have pupils enter new facts on own tables.

What numbers should be put in the spaces?

11. 7 × 5 = ...35 3 × 5 = ...15 0 × 5 = ...0

12. 1 × 5 = ...5 6 × 5 = ...30 9 × 5 = ...45

13. 8 × 5 = ...40 5 × 5 = ...25 4 × 5 = ...20

Again, if pupils have difficulty, let them use objects or make dot drawings to discover facts. Stress additive nature of multiplication (three 5's, not 3 times 5) and have pupils prove facts by addition.

Teach reverses of the 5's. Review commutative principle for multiplication.

Multiplying by 5

1. How many are 5 × 4? 20 How many are 4 × 5? 20 Do 5 × 4 and 4 × 5 each have the same product? Yes

2. How many are 6 × 5? 30 How many are 5 × 6? 30 **If two numbers are reversed, their product is the same.** What is this principle called? See page 55.
Stress.

3. How many are 7 × 5? 35 If you reverse the numbers, you get 5 × 7. How many are 5 × 7? 35

4. How many are 8 × 5? 40 5 × 8? 40 How many are 9 × 5? 45 5 × 9? 45 How many are 0 × 5? 0 5 × 0? 0

5. Learn these multiplication facts: Make flash cards for drill.

0	1	2	3	4	5	6	7	8	9
5	5	5	5	5	5	5	5	5	5
0	5	10	15	20	25	30	35	40	45

Multiply these numbers: Be sure pupils say "three 5's," and so on.

6.	5	9	5	5	7	3	5	0	2
	3	5	6	8	5	5	4	5	5
	15	45	30	40	35	15	20	0	10
7.	5	5	4	5	1	5	8	9	6
	7	2	5	9	5	5	5	5	5
	35	10	20	45	5	25	40	45	30

8. Fred used 8 hooks on each tie holder that he made. How many hooks did he use for 5 tie holders? 40

Tell what numbers to put in the spaces:

9. . . 7 . . 5's = 35 . . 2 . . 5's = 10 . . 5 . . 9's = 45

10. . . 5 . . 8's = 40 . . 9 . . 5's = 45 . . 4 . . 5's = 20

11. . . 5 . . 5's = 25 . . 5 . . 6's = 30 . . 3 . . 5's = 15

Have pupils prove commutative principle in ex. 2 using objects to show 6 groups of 5's and 5 groups of 6's, or by adding six 5's and five 6's. Enter new facts on individual tables.

Carrying Two Times

1. **Problem** Mother bought 2 cowboy suits for the boys. She paid $4.98 for each one. How much did she pay for both cowboy suits? $ 9.96

Explanation Here is a short way to think when you multiply:

Cents: 2 × 8 = 16. Write 6 and carry 1.
Dimes: 2 × 9 = 18. 18 + 1 (carried) = 19. Write 9 and carry 1.
Dollars: 2 × 4 = 8. 8 + 1 (carried) = 9. Write 9 in the product. The answer is $9.96.

$$\begin{array}{r} \$4.98 \\ 2 \\ \hline \$9.96 \end{array}$$

Mother paid $9.96 for both suits for the boys. Check by going over the work.

2. Mother also bought cowboy boots for the boys. Each pair cost $5.75. How much did both pairs cost? $11.50

3. The boys are saving money to buy cowboy hats for themselves. If they buy 2 hats at $1.79 each, how much money do they need to save? $3.58

4. The boys may decide to buy better hats that cost $2.56 each. Then how much money do they need to save? $5.12

Multiply. Check by going over your work: Do work orally.

5.	175 2 350	396 2 792	495 2 990	188 2 376	267 3 801	354 3 1062
6.	136 3 408	248 3 744	125 4 500	236 4 944	183 4 732	229 4 916

Do ex. 1 by addition first, stressing order (cents first) and exchange of cents and dimes. Follow this with ex. 1 explanation, stressing how and why numbers are carried.

More Work in Carrying

Multiply. Check by going over your work:

1.	128 5 640	193 5 965	237 5 1185	468 5 2340	$.95 5 $4.75	$2.56 5 $12.80
2.	384 3 1152	174 5 870	329 4 1316	382 5 1910	$.47 5 $2.35	$1.32 8 $10.56
3.	259 5 1295	746 5 3730	489 2 978	354 5 1770	$.92 5 $4.60	$1.36 5 $6.80
4.	325 6 1950	197 5 985	224 9 2016	688 5 3440	$.55 7 $3.85	$3.58 5 $17.90

5. Mother bought 5 Christmas presents today. She paid $2.75 for each one. How much did Mother pay for these presents? $13.75

6. Jane practiced her music lesson 50 min. every school day this week. How many minutes in all is this for 5 da.? 250 Did Jane practice about 3 hr. or 4 hr.? About 4 hr.

7. Tom sold 8 tickets at $.55 each. How much money did he get for them? $4.40

Multiply each number by 5;⁽¹⁾ by 3;⁽²⁾ by 4;⁽³⁾ by 2:⁽⁴⁾ See G-37 for (4).

(1), (2) (3) **8.**	675, 405 135 540	1130, 678 226 904	2070, 1242 414 1656	2660, 1596 532 2128	1320, 792 264 1056	895, 537 179 716
9.	1535, 921 307 1228	1455, 873 291 1164	740, 444 148 592	1400, 840 280 1120	2115, 1269 423 1692	1365, 819 273 1092
10.	2990, 1794 598 2392	3395, 2037 679 2716	2250, 1350 450 1800	880, 528 176 704	760, 456 152 608	1725, 1035 345 1380
11.	835, 501 167 668	1845, 1107 369 1476	1970, 1182 394 1576	930, 558 186 744	1205, 723 241 964	890, 534 178 712

Have pupils do some examples orally to check understanding of process. Be sure pupils add number carried "after" next multiplication. Have them tell how and why they are carrying.

Addition and Subtraction Review

Add these numbers and check the work:

1.	7	9	8	2	42	33	21	15
	2	6	4	7	11	22	57	47
	9	3	6	9	14	26	84	30
	4	8	5	2	32	13	26	24
	22	26	23	20	99	94	188	116
2.	4	7	4	4	30	55	84	69
	0	1	5	3	21	61	38	17
	3	5	7	5	33	70	66	51
	4	4	2	5	15	12	46	45
	11	17	18	17	99	198	234	182

3.	5424	2433	2663	5165	3047
	2331	2341	1042	1071	1662
	2141	1204	3125	1467	1219
	9896	5978	6830	7703	5928

4. Find the sum of 1143, 1497, and 4279. 6919

5. Add these numbers: 99, 30, 86, 56, 29. 300

6. How much more is \$20.00 than \$17.89? \$2.11 How much less is \$43.28 than \$50.25? \$6.97

Subtract these numbers and check the work:

7.	756	856	474	7389	4938	5748
	266	425	397	4168	3627	5241
	490	431	77	3221	1311	507
8.	787	722	400	2985	1287	1300
	739	475	251	2782	826	465
	48	247	149	203	461	835
9.	903	900	775	5969	1812	4896
	249	513	388	4439	814	1572
	654	387	387	1530	998	3324

More Practice. See ⑱ on page 319. Use to reinforce skills.

Urge pupils to work quickly and accurately. Use folded-paper method explained on page 328. Pupils might enjoy doing some of the examples as relay race activity on blackboard.

Develop mental arithmetic skill through problems.

Oral Problems

1. Bill makes and sells Christmas cards. He sells 5 cards in a package. How many cards are there in 2 packages? 10 in 4 packages? 20 in 7 packages? 35

2. Bill sells each package of Christmas cards for 20¢. How much does he get for 2 packages? 40¢ for 3 packages? 60¢ for 4 packages? 80¢

3. Mary's mother gave Bill 50¢ to pay for 1 package of cards at 20¢. Count the change that Bill gave Mary's mother. Count it in 2 different ways.(1) Are there any other ways to count it?(2) (1) 20, 25, 50; 20, 30, 40, 50; (2) Yes

4. Name a group of 3 coins that make 40¢.(1) Name 5 coins that make 40¢.(2) (1) Nickel, dime, quarter; (2) 2 nickels, 3 dimes

5. Jack needs 15¢ to ride on the bus. He has 9¢ in his pocket. How much more money should Jack have before he gets on the bus? 6¢

6. How many 4-cent oranges can you buy for 20¢? 5

7. Find the cost of 5 peanut bars at 7¢ each. 35¢

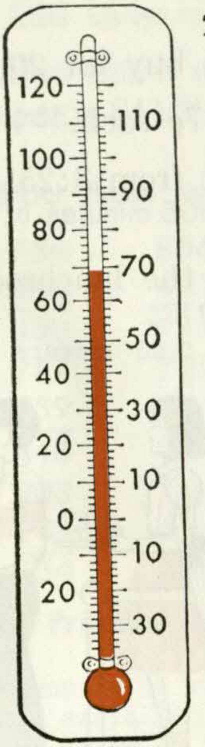
8. How many hours and minutes is it from 3:25 P.M. until 5:10 P.M.? Look at a clock. 105 minutes or 1 hour, 45 minutes

9. Susan spent 3¢, 8¢, 5¢, and 2¢ in the lunchroom. How much in all did Susan spend? 18¢

Urge pupils not to use pencil or paper to find answers.

Studying the Thermometer

1. Ann wanted to swim in the ocean but Mother said it was too cold. They looked at a thermometer. The number at the top of the red liquid in the thermometer was 50. Mother said, "When the temperature of the air is 50 degrees, it is too cold to swim." How high is the temperature when you like to swim? Temperature is measured in **degrees.**



2. When you want to know how hot or cold it is, look at a thermometer and read the number of degrees of temperature. You write 50 degrees like this: 50°. The sign ° after a number means **degrees.** The liquid in the glass tube goes up when the temperature gets warmer and goes down when it gets colder.

3. The thermometer at the left shows a temperature of 68°. The red liquid reaches to 4 marks above 60. Each mark means 2°, so 4 marks mean 8°. A temperature of 68° is the most comfortable temperature for a room.

Ask pupils if they have ever seen a thermometer, and whether the liquid in it was red or silver. Explain that red liquid is colored alcohol and silver liquid is mercury. Discuss uses of thermometer. Then do ex. 1-12.

4. On the thermometer on page 96 find where the liquid would end when the temperature is 40°; 80°; 52°; 94°; 32°.

5. Water starts to freeze when the temperature is 32° or below. In winter does the temperature go to 32° or below where you live? Try to find out how low the temperature does go where you live.

6. When the temperature goes to 0° or below, it is very cold. Does the temperature where you live ever go below 0°?

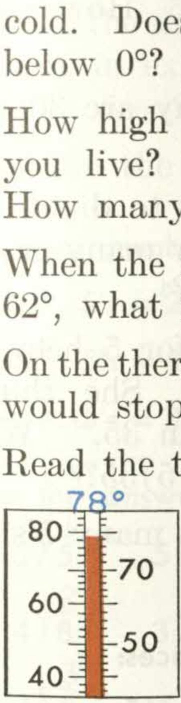
7. How high does the summer temperature go where you live? Is a temperature of 96° comfortable? No How many degrees above 68° is 96°? 28°

8. When the red liquid ends halfway between 60° and 62°, what is the temperature? 61°

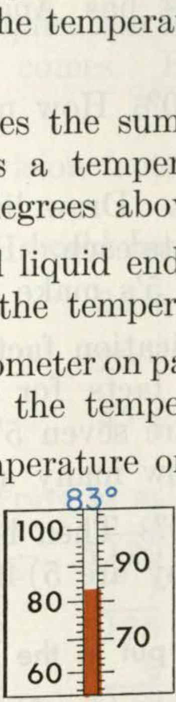
9. On the thermometer on page 96 show where the liquid would stop if the temperature were 85°; 37°; 49°.

10. Read the temperature on each thermometer below:

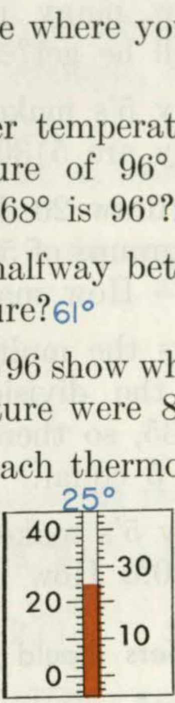
78°



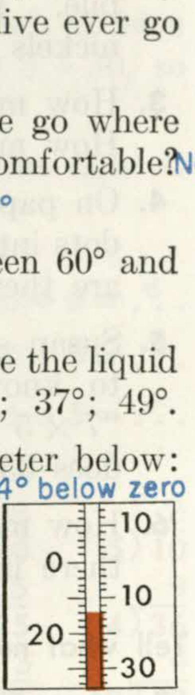
83°



25°



14° below zero



11. Draw a thermometer on the blackboard or on paper. Show where the liquid would end if the temperature were 30°; if it were 67°; 0°; 10° below zero; 25° below zero.

***12.** Each morning for a week draw a thermometer to show the outdoor temperature that morning. The radio will give it.

*See G-38 for directions for construction of classroom thermometer. If possible, display some thermometers in different parts of room. Give pupils chance to read them and show temperature on classroom one.

Develop readiness for division facts of 5's.

Making Equal Groups

1. Andy has 30 pennies. He wants to have them changed to nickels. How many nickels will he get? 6

2. Andy knows that five pennies equal one nickel. He puts his 30 pennies in piles with 5 pennies in each pile. How many piles has Andy? 6 How many nickels will he get? 6

3. How many 5's make 30? 6 How many are 30 ÷ 5? 6 How many are $5\overline{)30}$? 6

4. On paper draw 20 dots. Draw lines to divide the dots into groups of 5 dots each. How many groups are there? 4 How many 5's make 20? 4

5. Susan says the multiplication facts for 5 help her to know the division facts for 5. She thinks, "7 × 5 = 35, so there are seven 5's in 35." What does 35 ÷ 5 equal? 7 How many are $5\overline{)35}$? 7

6. How many 5's make 40? 8 Then how many 5's are there in 40? 8 How many are $5\overline{)40}$? 8

Tell what numbers should be put in the spaces:

7. . 9 . × 5 = 45, so there are . 9 . 5's in 45.

8. . 4 . × 5 = 20, so there are . 4 . 5's in 20.

9. . 7 . × 5 = 35, so there are . 7 . 5's in 35.

10. . 5 . × 5 = 25, so there are . 5 . 5's in 25.

11. At 5¢ each, how many apples can you buy for 15¢? 3

12. How many nickels can you get for 45 pennies? 9

With toy pennies or counters help pupils discover how many nickels they can get for: 40¢, 25¢, 15¢, and so on. Then proceed with page. Have pupils use own multiplication tables to discover facts.

Teach division facts of 5's. Review those of 2's, 3's, and 4's.

The 5's Facts in Division

1. Learn these new division facts: Make flash cards.

$\begin{array}{r}0\\5\overline{)0}\end{array}$ $\begin{array}{r}1\\5\overline{)5}\end{array}$ $\begin{array}{r}2\\5\overline{)10}\end{array}$ $\begin{array}{r}3\\5\overline{)15}\end{array}$ $\begin{array}{r}4\\5\overline{)20}\end{array}$

$\begin{array}{r}5\\5\overline{)25}\end{array}$ $\begin{array}{r}6\\5\overline{)30}\end{array}$ $\begin{array}{r}7\\5\overline{)35}\end{array}$ $\begin{array}{r}8\\5\overline{)40}\end{array}$ $\begin{array}{r}9\\5\overline{)45}\end{array}$

2. Tell the multiplication fact from which each division fact in ex. 1 comes. For example, $8 \times 5 = 40$, so $40 \div 5 = 8$.

3. Write the division facts in ex. 1, using the sign ÷.

Tell what numbers should be put in the spaces:

4. .5. 5's = 25 $35 \div 5 =$ .7. $30 \div 5 =$ .6.

5. .2. 5's = 10 $20 \div 5 =$ .4. $40 \div 5 =$ .8.

6. .3. 5's = 15 $45 \div 5 =$ .9. $5 \div 5 =$ .1.

Give the answers: Prove by multiplication facts.

7. $\begin{array}{r}1\\5\overline{)5}\end{array}$ $\begin{array}{r}9\\5\overline{)45}\end{array}$ $\begin{array}{r}4\\5\overline{)20}\end{array}$ $\begin{array}{r}8\\3\overline{)24}\end{array}$ $\begin{array}{r}8\\5\overline{)40}\end{array}$ $\begin{array}{r}2\\5\overline{)10}\end{array}$

8. $\begin{array}{r}2\\4\overline{)8}\end{array}$ $\begin{array}{r}6\\3\overline{)18}\end{array}$ $\begin{array}{r}7\\5\overline{)35}\end{array}$ $\begin{array}{r}7\\2\overline{)14}\end{array}$ $\begin{array}{r}5\\5\overline{)25}\end{array}$ $\begin{array}{r}9\\4\overline{)36}\end{array}$

9. $\begin{array}{r}3\\2\overline{)6}\end{array}$ $\begin{array}{r}6\\4\overline{)24}\end{array}$ $\begin{array}{r}6\\2\overline{)12}\end{array}$ $\begin{array}{r}9\\5\overline{)45}\end{array}$ $\begin{array}{r}3\\5\overline{)15}\end{array}$ $\begin{array}{r}4\\3\overline{)12}\end{array}$

10. $\begin{array}{r}1\\4\overline{)4}\end{array}$ $\begin{array}{r}5\\5\overline{)25}\end{array}$ $\begin{array}{r}8\\4\overline{)32}\end{array}$ $\begin{array}{r}6\\5\overline{)30}\end{array}$ $\begin{array}{r}5\\2\overline{)10}\end{array}$ $\begin{array}{r}4\\4\overline{)16}\end{array}$

11. $\begin{array}{r}1\\5\overline{)5}\end{array}$ $\begin{array}{r}9\\2\overline{)18}\end{array}$ $\begin{array}{r}7\\3\overline{)21}\end{array}$ $\begin{array}{r}2\\5\overline{)10}\end{array}$ $\begin{array}{r}5\\3\overline{)15}\end{array}$ $\begin{array}{r}7\\5\overline{)35}\end{array}$

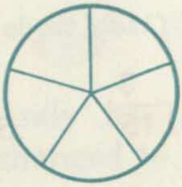
12. $\begin{array}{r}2\\3\overline{)6}\end{array}$ $\begin{array}{r}6\\5\overline{)30}\end{array}$ $\begin{array}{r}3\\5\overline{)15}\end{array}$ $\begin{array}{r}8\\5\overline{)40}\end{array}$ $\begin{array}{r}8\\2\overline{)16}\end{array}$ $\begin{array}{r}4\\5\overline{)20}\end{array}$

13. $\begin{array}{r}4\\2\overline{)8}\end{array}$ $\begin{array}{r}5\\4\overline{)20}\end{array}$ $\begin{array}{r}9\\3\overline{)27}\end{array}$ $\begin{array}{r}7\\4\overline{)28}\end{array}$ $\begin{array}{r}3\\4\overline{)12}\end{array}$ $\begin{array}{r}9\\5\overline{)45}\end{array}$

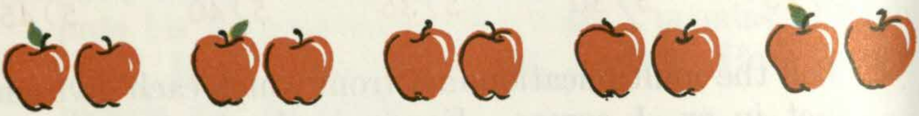
Have pupils prove facts by subtraction. Vary practice on facts by game. Write 45 on board. Ask pupils for two facts about 5 whose product is 45; then whose dividend is 45, and so on.

Teach how to find $\frac{1}{5}$ of a number.

One Fifth



1. This circle is divided into 5 equal parts. Each part is called **one fifth.** You write one fifth like this: $\frac{1}{5}$. The whole circle is 5 fifths. This shows that $\frac{5}{5} = 1$.



2. Here are 10 apples divided into 5 equal groups. Each group is $\frac{1}{5}$ of 10 apples. How many are $\frac{1}{5}$ of 10 apples? 2 How many are $\frac{1}{5}$ of 10? 2

Demonstrate and emphasize.

To find $\frac{1}{5}$ of a number, divide it by 5.

3. On paper draw 15 crosses by putting them one at a time into 5 equal groups. How many crosses have you put in each group? 3 How many are $\frac{1}{5}$ of 15? 3 How many are $15 \div 5$? 3

4. Find $\frac{1}{5}$ of 30; 6 $\frac{1}{5}$ of 45; 9 $\frac{1}{5}$ of 20; 4 $\frac{1}{5}$ of 35; 7 $\frac{1}{5}$ of 25. 5

Find the answers: Use dot drawings to show answers.

5. $\frac{1}{5}$ of 5¢ 1¢ $\frac{1}{5}$ of 25¢ 5¢ $\frac{1}{5}$ of 40¢ 8¢ $\frac{1}{5}$ of 30¢ 6¢
6. $\frac{1}{3}$ of 9¢ 3¢ $\frac{1}{5}$ of 35¢ 7¢ $\frac{1}{5}$ of 10¢ 2¢ $\frac{1}{5}$ of 20¢ 4¢
7. $\frac{1}{4}$ of 4¢ 1¢ $\frac{1}{3}$ of 27¢ 9¢ $\frac{1}{5}$ of 45¢ 9¢ $\frac{1}{4}$ of 28¢ 7¢
8. $\frac{1}{2}$ of 8¢ 4¢ $\frac{1}{4}$ of 20¢ 5¢ $\frac{1}{2}$ of 16¢ 8¢ $\frac{1}{5}$ of 40¢ 8¢
9. $\frac{1}{3}$ of 3¢ 1¢ $\frac{1}{5}$ of 15¢ 3¢ $\frac{1}{3}$ of 18¢ 6¢ $\frac{1}{4}$ of 12¢ 3¢

Demonstrate ex. 1 with fractional parts on flannelboard, stressing equality of the 5 parts. Then have pupils use objects to discover that finding $\frac{1}{5}$ of a number is same as dividing it by 5. Ask questions such as, "What part of 10 is 2?" "What is $\frac{1}{5}$ of 10?"

A Walk in the Woods

Develop understanding that commutative principle applies to large numbers in multiplication.

1. The 30 children in Miss Hill's room went out to gather leaves and nuts. They went in 5 cars. The same number of children rode in each car. How many children rode in each car? 6

2. There are 14 girls in Miss Hill's room. How many boys are there? 16 There are 30 children in all.

3. The boys picked up 280 nuts. They gave half to the girls. How many nuts did the boys give the girls? 140

4. Miss Hill and 5 mothers went with the children. How many people were there in all? 36

5. The girls picked up 36 red leaves, 28 yellow leaves, and 18 brown ones. How many leaves did they have all together? 82

6. For lunch there were 4 sandwiches for each one. How many sandwiches were there in all? 144

A	B
4	36
36	4

▶ You see it is hard to multiply 4 by 36 as in A. You know that 6 × 4 has the same product as 4 × 6. So 36 × 4 has the same product as 4 × 36. Multiply as in B. Remember the answer stands for sandwiches. Have pupils do other similar examples.

Review commutative principle as applied to basic facts. Then have pupils use addition to prove that it applies to large numbers (use 11 × 2 and have pupils add 2 eleven times, then add 11 two times).

Review even division facts and division without carrying.

Division Practice

Divide these numbers:

1. $5\overset{1}{\overline{)5}}$ $5\overset{8}{\overline{)40}}$ $5\overset{11}{\overline{)55}}$ $5\overset{111}{\overline{)555}}$ $5\overset{61}{\overline{)305}}$ $5\overset{110}{\overline{)550}}$

2. $5\overset{0}{\overline{)0}}$ $5\overset{9}{\overline{)45}}$ $5\overset{7}{\overline{)35}}$ $5\overset{41}{\overline{)205}}$ $5\overset{100}{\overline{)500}}$ $5\overset{51}{\overline{)255}}$

3. $5\overset{1}{\overline{)5}}$ $5\overset{10}{\overline{)50}}$ $5\overset{4}{\overline{)20}}$ $5\overset{80}{\overline{)400}}$ $5\overset{20}{\overline{)100}}$ $5\overset{30}{\overline{)150}}$

4. Betty has 50¢. How many 5-cent Christmas cards can she buy? 10

5. Uncle Jim had 350 old stamps. He divided them equally among 5 children. How many stamps did each child get? 70

Find the answers:

6. $\frac{1}{5}$ of 450 90 $\frac{1}{5}$ of 355 71 $\frac{1}{5}$ of 505 101 $\frac{1}{5}$ of 105 21

7. $\frac{1}{5}$ of 155 31 $\frac{1}{5}$ of 405 81 $\frac{1}{5}$ of 200 40 $\frac{1}{5}$ of 455 91

8. $\frac{1}{5}$ of 300 60 $\frac{1}{5}$ of 250 50 $\frac{1}{5}$ of 550 110 $\frac{1}{5}$ of 350 70

Give the answers as quickly as you can:

9. $5\overset{1}{\overline{)5}}$ $2\overset{9}{\overline{)18}}$ $4\overset{6}{\overline{)24}}$ $3\overset{7}{\overline{)21}}$ $5\overset{8}{\overline{)40}}$ $4\overset{9}{\overline{)36}}$

10. $3\overset{3}{\overline{)9}}$ $5\overset{3}{\overline{)15}}$ $4\overset{3}{\overline{)12}}$ $5\overset{4}{\overline{)20}}$ $2\overset{7}{\overline{)14}}$ $3\overset{5}{\overline{)15}}$

11. $2\overset{3}{\overline{)6}}$ $5\overset{7}{\overline{)35}}$ $4\overset{4}{\overline{)16}}$ $5\overset{2}{\overline{)10}}$ $3\overset{9}{\overline{)27}}$ $5\overset{6}{\overline{)30}}$

12. $4\overset{1}{\overline{)4}}$ $3\overset{6}{\overline{)18}}$ $2\overset{6}{\overline{)12}}$ $4\overset{8}{\overline{)32}}$ $2\overset{8}{\overline{)16}}$ $3\overset{4}{\overline{)12}}$

13. $2\overset{4}{\overline{)8}}$ $4\overset{7}{\overline{)28}}$ $3\overset{8}{\overline{)24}}$ $5\overset{9}{\overline{)45}}$ $4\overset{5}{\overline{)20}}$ $5\overset{5}{\overline{)25}}$

Let different pupils act as teachers in conducting the review. You can then note individual errors or hesitancy on progress cards. Use flash cards for drill on facts if necessary.

Teach uneven division facts of 5's.

Changing Pennies to Nickels

1. Susan put 16 pennies in groups with 5 pennies in each group. She said she could change the 3 groups of 5 pennies each to 3 nickels. Then she would have 3 nickels and 1 penny left over.

2. Bill told Susan she could have divided 16 by 5 to find the answer, which is 3 R1. What does 3 in the answer tell? 3 nickels What does 1 tell? 1 penny left over

$$\begin{array}{r}3\text{ R}1\\5\overline{)16}\\\underline{15}\\1\end{array}$$

3. Divide to find how many nickels you can get for 23 pennies. 4R3¢; 4 nickels How many pennies will be left over? 3

4. Give the answers when you change these pennies to nickels: 46¢, 19¢, 27¢, 38¢, 42¢, 34¢, 21¢, 13¢. Write the work as Bill did in ex. 2. 9R1¢, 3R4¢, 5R2¢, 7R3¢, 8R2¢, 6R4¢, 4R1¢, 2R3

Find the answers: Do work as in ex. 2.

5. $\overset{1\text{R}1}{5\overline{)6}}$ $\overset{2\text{R}4}{5\overline{)14}}$ $\overset{5\text{R}4}{5\overline{)29}}$ $\overset{9\text{R}2}{5\overline{)47}}$ $\overset{6\text{R}3}{5\overline{)33}}$ $\overset{4\text{R}2}{5\overline{)22}}$

6. $\overset{1\text{R}4}{5\overline{)9}}$ $\overset{9\text{R}3}{5\overline{)48}}$ $\overset{2\text{R}2}{5\overline{)12}}$ $\overset{7\text{R}2}{5\overline{)37}}$ $\overset{8\text{R}3}{5\overline{)43}}$ $\overset{6\text{R}1}{5\overline{)31}}$

7. Jack has 3 marbles. Can he divide them equally among 5 boys? No

▶ You see Jack has not enough marbles to give each boy 1 marble. So the answer is 0 and there is a remainder of 3. You write the answer like this: 0 R3.

$$\begin{array}{r}0\text{ R}3\\5\overline{)3}\\\underline{0}\\3\end{array}$$

8. Divide these numbers by 5: 4, 8, 2, 7, 1, 11. 0R4, 1R3, 0R2, 1R2, 0R1, 2R1

Let pupils use toy money, if needed, in ex. 1-4. Be sure they know that quotient figure is nickels, and remainder is pennies. Give oral practice in other uneven facts not listed here.

Continue work with uneven facts. Show how to determin
correctness of quotient

Is the Division Right?

1. Betty has 22¢. How many 5-cent candy bars can she buy? 4 Will she have any money left over? 2¢ left over

A

$$\begin{array}{r} 3 \\ 5\overline{)22} \\ 15 \\ \hline 7 \end{array}$$

2. Betty divided 22 by 5, as shown at A. She said, "I can buy 3 candy bars and I will have 7¢ left." Is Betty right? No

B

$$\begin{array}{r} 4 \\ 5\overline{)22} \\ 20 \\ \hline 2 \end{array}$$

3. Andy said, "Betty is wrong. She can buy 1 more candy bar with the 7¢ left over. She can buy 4 candy bars and have 2¢ left." Andy did the work as shown at B.

4. Andy said he knew Betty's work was wrong because the remainder was larger than 5. Andy's work is right because 2 is smaller than 5. **The remainder must always be smaller than the number by which you divide.** Emphasize.

Divide each number by 5. Do the work as shown above:

5. 17 3R2 44 8R4 39 7R4 26 5R1 18 3R3 41 8R1 32 6R2 3 0R

6. 24 4R4 36 7R1 28 5R3 49 9R4 33 6R3 19 3R4 27 5R2 6 1R1

7. Five children shared a box of 144 sheets of paper. How many sheets did each child get? 28 Were any sheets left over? 4
▶ Study the work at the right. If you do not know how each step is done, turn back to pages 76 and 78. Check the work by multiplying 28 by 5; then add the remainder 4. Does this equal 144? Yes

$$\begin{array}{r} 28\text{ R4} \\ 5\overline{)144} \\ 10 \\ \hline 44 \\ 40 \\ \hline 4 \end{array}$$

Be sure pupils understand why the remainder must be smaller. Let them use objects to follow ex. 1-3 and actually see that there is one more 5 in 22. Remind pupils of "helping numbers' (see page 74).

Review division with carrying, with 5 as divisor.

Division Practice

Divide the numbers. Watch for remainders. Use long form.

1.	$5\overline{)140}$ 28	$5\overline{)177}$ 35R2	$5\overline{)320}$ 64	$5\overline{)415}$ 83	$5\overline{)488}$ 97R3
2.	$5\overline{)295}$ 59	$5\overline{)235}$ 47	$5\overline{)134}$ 26R4	$5\overline{)261}$ 52R1	$5\overline{)375}$ 75
3.	$5\overline{)480}$ 96	$5\overline{)429}$ 85R4	$5\overline{)185}$ 37	$5\overline{)195}$ 39	$5\overline{)312}$ 62R2
4.	$5\overline{)436}$ 87R1	$5\overline{)210}$ 42	$5\overline{)392}$ 78R2	$5\overline{)465}$ 93	$5\overline{)120}$ 24
5.	$5\overline{)365}$ 73	$5\overline{)285}$ 57	$5\overline{)423}$ 84R3	$5\overline{)345}$ 69	$5\overline{)233}$ 46R3
6.	$5\overline{)224}$ 44R4	$5\overline{)395}$ 79	$5\overline{)280}$ 56	$5\overline{)191}$ 38R1	$5\overline{)125}$ 25

7. How many 5-cent pencils can Bob buy for 75¢? 15

More Practice. See ⑲ on page 319. Use for reteaching.

Review Practice

Brighter pupils may do this orally.

Copy. Watch the signs. Check your work:

8.	280 + 342 622	5 × 38 190	190 ÷ 3 63R1
9.	375 − 219 156	73 + 49 122	300 − 108 192
10.	385 ÷ 5 77	4 × 107 428	156 ÷ 2 78
11.	600 − 456 144	175 − 87 88	148 × 4 592
12.	137 + 283 420	392 ÷ 4 98	215 + 67 282
13.	424 ÷ 5 84R4	37 × 5 185	318 ÷ 5 63R3

Do ex. 14 as game with class divided into teams.

14. Give the answers to the addition facts on page 7 and the subtraction facts on page 13.

Have pupils explain some problems in ex. 1–7 to check that all 5 steps are used in finding each quotient figure. Have them explain placement of quotient figures and any exchange involved.

Teach new problem pattern in division.

Buying Things –

1. Mary bought 2 cupcakes in a package. She paid 10¢ for the package. Find the cost of 1 cupcake. 10¢ ÷ 2 = 5¢
2. She also bought 5 carrots in a bunch. The bunch of carrots cost 15¢. Find the cost of 1 carrot. 15¢ ÷ 5 = 3¢
3. A package of 4 sweet rolls cost 12¢. Find the cost of 1 sweet roll. 12¢ ÷ 4 = 3¢
4. Mary bought 2 chops in a package. She paid 54¢ for them. Find the cost of 1 chop. 54¢ ÷ 2 = 27¢
5. A 2-pound box of crackers cost 50¢. Find the cost of 1 pound of crackers. 50¢ ÷ 2 = 25¢
6. Mary paid 15¢ for 3 oranges. What was the cost of 1 orange? 15¢ ÷ 3 = 5¢

Emphasize and add to class chart.

Suppose you know the cost of two or more of the same things. To find the cost of one thing, you should divide.

Real objective is to develop awareness of shopping and of costs of articles. Have pupils report on current prices of articles and make up class problems. They might illustrate problems with pictures from magazines.

Review Practice

1. Add 398: 402 800 156 554 290 688 357 755

2. Subtract 137: 719 582 870 733 200 63 522 385

3. Multiply by 5: 187 935 509 2545 364 1820 492 2460

4. Divide by 4: 348 87 253 63R1 236 59 379 94R3

Give the answers:

5. (5 × 7) + 3 38 5 + (8 × 4) 37 (4 × 7) + 3 31

6. (6 × 2) + 1 13 7 + (9 × 5) 52 (5 × 6) + 2 32

Multiply each number in ex. 7 and 8 by 4:

7. 200 800 312 1248 124 496 207 828 356 1424 149 596

8. 103 412 380 1520 231 924 465 1860 587 2348 496 1984

9. Multiply each number in ex. 7 and 8 by 5. Ex.7: 1000, 1560, 620, 1035, 1780, 745; ex.8: 515, 1900, 1155, 2325, 2935, 2480

Divide each number in ex. 10 and 11 by 5:

10. 305 61 255 51 335 67 236 47R1 195 39 214 42R4

11. 480 96 143 28R3 260 52 290 58 376 75R1 395 79

12. Divide each number in ex. 10 and 11 by 4. Ex.10: 76R1, 63R3, 83R3, 59, 48R3, 53R2; ex.11: 120, 35R3, 65, 72R2, 94, 98R3

Use a clock to find the time from

13. 2:15 to 2:45 30 min. 10:06 to 10:43 37 min. 10:25 to 12:40 2 hr., 15 min.

14. 1:30 to 2:55 1 hr., 25 min. 10:52 to 11:09 17 min. 11:15 to 12:04 49 min.

Copy in columns and add. Check your work:

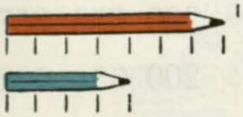
15. 386 + 291 + 470 + 392 1539 459 + 484 + 553 + 606 2102

16. 538 + 285 + 357 + 244 1424 619 + 153 + 357 + 871 2000

Group pupils who did poorly on this review. Urge them to find own mistakes and reasons for them, for example, carrying, basic facts, regrouping, even and uneven division, carelessness.

Present new subtraction thought pattern.

Finding the Difference



1. How much longer is a 7-inch pencil than a 4-inch pencil? 3 in.

▶ To find how much longer one pencil is than the other, you find the **difference** between 7 and 4. To find the difference, you subtract 4 from 7.

2. Find the difference between \$5.00 and \$3.47. \$5.00 - \$3.47 = \$1.53

Emphasize.

To find the difference between two numbers, you subtract.

3. Jim is 10 years old. His little sister Ann is 6 years old. What is the difference in their ages? 4 years

4. Jim's new coaster wagon is 34 in. long. Ann's new wagon is 20 in. long. What is the difference in the lengths of the wagons? 14 in.

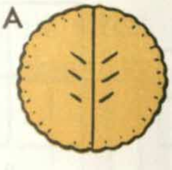
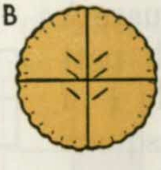
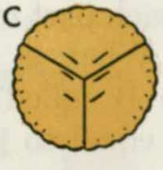
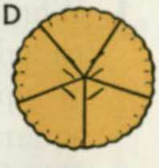
5. Jim's wagon cost \$8.79. Ann's cost \$2.98. What is the difference in the prices of the two wagons? \$5.81

6. Jim weighs 65 pounds. Ann weighs 39 pounds. What is the difference in their weights? 26 pounds

Illustrate meaning of difference through use of objects or dot drawings, showing both the subtrahend and minuend. After word is understood, place on vocabulary chart (page 5). Have pupils use new word in own problems.

Reteach meaning of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$ of an object. Teach new vocabulary word "fraction."

Dividing Things Equally

A

B

C

D


1. Each pie above is cut into equal pieces. What is each piece of pie A called? One half Write the name of this piece in figures. $\frac{1}{2}$

2. Tell the name for each piece of pie in B, C, and D. (1) Write the names of these different pieces in figures. (2)
(1) B, one fourth or one quarter; C, one third; D, one fifth; (2) $\frac{1}{2}, \frac{1}{4}, \frac{1}{3}, \frac{1}{5}$

3. Numbers like $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$ are called **fractions.**

4. Which pie has the largest pieces? A What are these pieces called? Halves Which pie has the smallest pieces? D What are these pieces called? Fifths

5. The 4 pies above are all the same size. The pieces of pie in A are larger than the pieces in pies B, C, and D. Jack says that as you cut a pie into more equal parts, each part gets smaller. Is Jack right? Yes

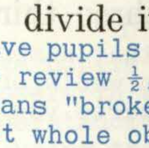
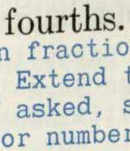
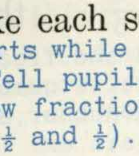
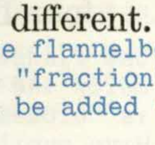
Let pupils use fractional parts in ex. 6–7.

Fill each space with the word larger or smaller:

6. $\frac{1}{2}$ pie is larger . . . than $\frac{1}{4}$ pie. $\frac{1}{3}$ pie is smaller . . . than $\frac{1}{2}$ pie.

7. $\frac{1}{5}$ pie is smaller . . . than $\frac{1}{2}$ pie. $\frac{1}{4}$ pie is larger . . . than $\frac{1}{5}$ pie.

8. Tell the name of each part of these squares:

One fourth

One third

One half

One fifth


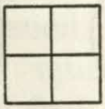
9. Draw 3 squares. Then draw lines on each one to divide it into fourths. Make each square different.

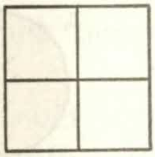
Have pupils use own fractional parts while you use flannelboard to review $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$. Extend to $\frac{1}{5}$. Tell pupils that "fraction" means "broken." If asked, show how fractions can be added to get whole object, or number (use $\frac{1}{2}$ and $\frac{1}{2}$).

Extend meaning of fractions to include $\frac{2}{3}$, $\frac{3}{4}$, $\frac{3}{5}$, and so on (pages 110-111).

Studying Fractions

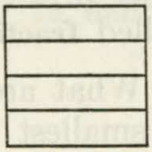
1. What is each part of square A called? What is each part of square B called? One fourth Is $\frac{1}{4}$ of square A equal to $\frac{1}{4}$ of square B? No Can you draw 2 squares and divide them into fourths so that $\frac{1}{4}$ of one square does equal $\frac{1}{4}$ of the other square? Yes You see that squares must be equal in size if the fourths are equal.*

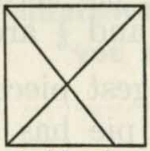

A

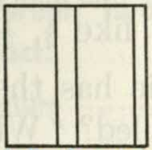

B

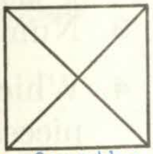
*Stress this point and demonstrate further.

2. Tell which squares below are divided into fourths: C and F


C


D

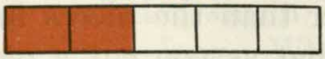

E


F

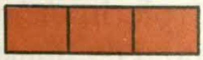
In ex. 2, have pupils tell why D and E do not show fourths.

3. What is each part of bar G called? of bar H?

One fifth


G

One third


H

4. How many fifths are there in bar G above? 5 How many fifths are colored red? 2 How many fifths are white? 3 You write three fifths like this: $\frac{3}{5}$. Write two fifths.

5. How many thirds are there in bar H above? 3 How many thirds are red? 3 Write your answer in figures.

6. Which picture above shows that $\frac{5}{5} = 1$? G Which shows that $\frac{4}{4} = 1$? A, B, C, F Which shows that $\frac{3}{3} = 1$? H

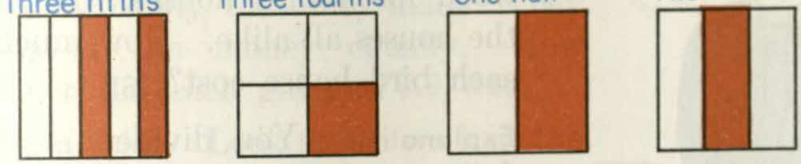
7. Write these fractions in figures:

one half $\frac{1}{2}$ one fourth $\frac{1}{4}$ one third $\frac{1}{3}$
two fifths $\frac{2}{5}$ two thirds $\frac{2}{3}$ three fifths $\frac{3}{5}$
four fifths $\frac{4}{5}$ three fourths $\frac{3}{4}$ three thirds $\frac{3}{3}$

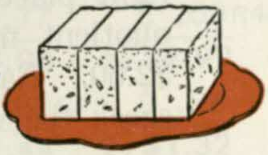
Use flannelboard and fractional parts to show that number below the line tells number of parts into which whole object is "broken," and number above tells number of parts you have. Have pupils explain ex. 7 in this way.

1. Tell what part of each square is white:

Three fifths Three fourths One half Two thirds



2. Write the four fractions that show what part of each square in ex. 1 is white.(1) Then write the four fractions that show what part of each square is red.(2)
(1) $\frac{3}{5}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{2}{3}$; (2) $\frac{2}{5}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{3}$



3. The cake at the right is cut into 4 equal pieces. What part of the whole cake is each of these pieces? One fourth

4. The girls ate two pieces of the cake. Write the fraction that shows how many fourths the girls ate. $\frac{2}{4}$ Can you write a different fraction that shows how much cake the girls ate? $\frac{1}{2}$

5. Then Bob ate one piece of the cake. How many fourths were gone then? $\frac{3}{4}$ Write the fraction that shows how many fourths were gone. Write the fraction that shows how many fourths were left. $\frac{1}{4}$

6. The girls ate $\frac{1}{2}$ of the cake and Bob ate $\frac{1}{4}$ of it. What part of the whole cake did the 3 children eat?(1) This shows that $\frac{1}{2}$ and $\frac{1}{4}$ together equal what fraction?(2)
(1) Three fourths ; (2) $\frac{3}{4}$

7. Draw a circle and divide it into 4 equal parts. Color 1 part blue. What part of the circle is blue?(1) What part of the circle is not blue?(2) (1) One fourth ; (2) three fourths

8. Draw a square and divide it into 3 equal parts. Color 1 part blue. Color 1 part red. What part of the square is colored? Two thirds Write this fraction in figures. $\frac{2}{3}$

Have pupils use fractional parts to find and demonstrate answers in ex. 1-6. Make up similar problems to reinforce understanding of nonunit fractions, and to give practice in using them.

Dividing Dollars and Cents

1. Problem Fred paid $2.60 for the wood for 4 bird houses. He made the houses all alike. How much did each bird house cost? $.65

Explanation You divide dollars and cents just as you divide other numbers. Be sure to write the quotient figures in the right places. The decimal point in the quotient must be put over the decimal point in $2.60. Each bird house cost $.65. How do you check the work? Check by multiplying quotient by divisor.

$$\begin{array}{r} \$.65 \\ 4\overline{)\$2.60} \\ \underline{2\;4} \\ 20 \\ \underline{20} \end{array}$$

2. Study these examples carefully: Have pupils explain these and ex. 3–8.

$\begin{array}{r} \$.50 \\ 5\overline{)\$2.50} \end{array}$ $\begin{array}{r} \$.20 \\ 4\overline{)\$.80} \end{array}$ $\begin{array}{r} \$.09 \\ 5\overline{)\$.45} \end{array}$ $\begin{array}{r} \$.08 \\ 3\overline{)\$.24} \end{array}$

Divide these numbers and check your work:

3. $\begin{array}{r} \$.24 \\ 4\overline{)\$.96} \end{array}$ $\begin{array}{r} \$.43 \\ 5\overline{)\$2.15} \end{array}$ $\begin{array}{r} \$.76 \\ 5\overline{)\$3.80} \end{array}$ $\begin{array}{r} \$.38 \\ 3\overline{)\$1.14} \end{array}$ $\begin{array}{r} \$.49 \\ 5\overline{)\$2.45} \end{array}$

4. $\begin{array}{r} \$.27 \\ 2\overline{)\$.54} \end{array}$ $\begin{array}{r} \$.76 \\ 3\overline{)\$2.28} \end{array}$ $\begin{array}{r} \$.82 \\ 5\overline{)\$4.10} \end{array}$ $\begin{array}{r} \$.53 \\ 4\overline{)\$2.12} \end{array}$ $\begin{array}{r} \$.85 \\ 5\overline{)\$4.25} \end{array}$

5. $\begin{array}{r} \$.18 \\ 5\overline{)\$.90} \end{array}$ $\begin{array}{r} \$.87 \\ 2\overline{)\$1.74} \end{array}$ $\begin{array}{r} \$.26 \\ 4\overline{)\$1.04} \end{array}$ $\begin{array}{r} \$.99 \\ 5\overline{)\$4.95} \end{array}$ $\begin{array}{r} \$.59 \\ 3\overline{)\$1.77} \end{array}$

6. $\begin{array}{r} \$.08 \\ 4\overline{)\$.32} \end{array}$ $\begin{array}{r} \$.65 \\ 5\overline{)\$3.25} \end{array}$ $\begin{array}{r} \$.24 \\ 5\overline{)\$1.20} \end{array}$ $\begin{array}{r} \$.94 \\ 4\overline{)\$3.76} \end{array}$ $\begin{array}{r} \$.95 \\ 5\overline{)\$4.75} \end{array}$

7. $\begin{array}{r} \$.29 \\ 3\overline{)\$.87} \end{array}$ $\begin{array}{r} \$.89 \\ 4\overline{)\$3.56} \end{array}$ $\begin{array}{r} \$.79 \\ 5\overline{)\$3.95} \end{array}$ $\begin{array}{r} \$.37 \\ 5\overline{)\$1.85} \end{array}$ $\begin{array}{r} \$.78 \\ 4\overline{)\$3.12} \end{array}$

8. $\begin{array}{r} \$.07 \\ 5\overline{)\$.35} \end{array}$ $\begin{array}{r} \$.88 \\ 5\overline{)\$4.40} \end{array}$ $\begin{array}{r} \$.68 \\ 2\overline{)\$1.36} \end{array}$ $\begin{array}{r} \$.68 \\ 5\overline{)\$3.40} \end{array}$ $\begin{array}{r} \$.45 \\ 3\overline{)\$1.35} \end{array}$

Stress placement of decimal point in quotient directly above decimal point in dividend. In ex. 1, explain fully why and how dollars are changed to dimes, why 6 is put in dimes place, how and why dimes are changed to pennies.

What Does the Remainder Mean?

1. **Problem** Four girls earned \$3.90 by selling candy that they made. They shared the money equally. How much did each girl get? \$.97 R2¢

```
  $.97 R2¢
4)$3.90
  3 6
    30
    28
     2
```

Explanation Look at the work at the right. You see each girl got \$.97 and there was a remainder of 2¢. They gave the 2¢ to little Jack for his bank. How do you check this? (Check by multiplying \$.97 by 4 and adding 2¢.)

Find the quotients and remainders:

2.	\$.16R3¢ 5)\$.83	\$ .85 2)\$1.70	\$ .96R4¢ 5)\$4.84	\$ .77 4)\$3.08	\$ .59R4¢ 5)\$2.99
3.	\$.09R2¢ 3)\$.29	\$ .32R2¢ 5)\$1.62	\$ .56 4)\$2.24	\$ .68R4¢ 5)\$3.44	\$ .66 2)\$1.32
4.	\$.16R2¢ 4)\$.66	\$ .64R4¢ 5)\$3.24	\$ .67R1¢ 2)\$1.35	\$ .87 5)\$4.35	\$ .36R1¢ 3)\$1.09
5.	\$.14R2¢ 5)\$.72	\$ .46R1¢ 4)\$1.85	\$ .77 5)\$3.85	\$ .86 3)\$2.58	\$ .35R2¢ 5)\$1.77
6.	\$.36R1¢ 2)\$.73	\$ .72 5)\$3.60	\$ .78 3)\$2.34	\$ .92R3¢ 5)\$4.63	\$ .64 4)\$2.56
7.	\$.23R1¢ 4)\$.93	\$ .26 5)\$1.30	\$ .98R1¢ 5)\$4.91	\$ .97R1¢ 2)\$1.95	\$ .84R3¢ 5)\$4.23
8.	\$.13R2¢ 5)\$.67	\$ .94 3)\$2.82	\$ .66 5)\$3.30	\$ .62R2¢ 4)\$2.50	\$ .95R2¢ 5)\$4.77

9. Three girls earned \$2.50. They divided the money equally. How much did each girl get? \$.83 Was any money left over? Yes, 1¢

10. Four boys shared the cost of a book that was \$2.75. How much was each boy's share? \$.68 Tell what the remainder of 3¢ means. Three boys paid 1¢ extra.

Remind pupils to remember whether they are dividing dollars, dimes, or pennies, and to place quotient figures in proper position. Have them explain few examples to check this.

Provide oral review of simple measures and arithmetic terms.

Oral Practice

Tell what numbers or words to put where the dots are:

1. 18 pennies = 3 . . . nickels and 3 . . . pennies.

2. 37 pennies = 7 . . . nickels and 2 . . . pennies.

3. 44 pennies = 8 . . . nickels and 4 . . . pennies.

4. The coin that is equal to 5 nickels is the . . . quarter.

5. Two measures of time are the . . . minute and the . . . hour.

6. In a store sugar is measured by the . . . pound.

7. Milk is measured by the . . . pint or by the . . . quart.

8. The measure used in selling cloth is the . . . yard.

Below each exercise are three words. Choose the right word to put in the space:

9. 15 is called the . . . difference in the example 45 − 30 = 15.

product difference quotient

10. 12 o'clock in the daytime is called . . . noon.

morning midnight noon

11. XII is called a . . . Roman numeral.

round Roman 3-figure

12. 25 is called the . . . quotient in the example 100 ÷ 4 = 25.

quotient remainder difference

13. 85 is called the . . . product in the example 5 × 17 = 85.

sum product quotient

14. 27 is the . . . sum in the example 7 + 9 + 3 + 8 = 27.

sum product difference

Group pupils who need further review or remedial work. Let others make study cards for those who have difficulty with arithmetic terms. Have them print the term on front of card and illustrate meaning on back, as a label, in a sentence or example, and so on.

Do you add, subtract, multiply, or divide to get the answer to each problem?

1. Ann knows the cost of a yard of ribbon. She knows how many yards of this ribbon she needs. How can she find the cost of all the ribbon? Multiply
2. Jack knows the amount of money he has saved. He knows it is not enough to buy the sweater he wants. How can he find how much more money he needs? Subtract
3. Bill knows how many boys will share the cost of a new tent. He knows the price of the tent they will buy. How can he find each boy's share of the cost? Divide

4. Mary knows how many cookies she baked and how many are left. How can she find how many cookies are gone? Subtract
5. Tom knows how many stamps are in his book, how many are in a box, and how many he bought today. How can he find the number of stamps he has all together? Add
6. Andy knows how many cents he can spend for lollipops. He knows the cost of one lollipop. How can he find the number of lollipops he can buy? Divide
7. Jane knows the cost of each thing she bought at the store. How can she find the amount she spent? Add
8. George knows his own age and Peggy's age. How can he find the difference in their ages? Subtract

Better pupils will probably do most of this work, but urge all to pick out key phrases or terms that tell process to use. Then have different pupils suggest real numbers for the problems, and have class solve them.

Review Practice

Add and check:

1.	39	52	26	56	44	91	69
	26	13	40	26	36	15	23
	14	28	38	67	25	47	38
	53	86	37	75	48	27	44
	132	179	141	224	153	180	174

Subtract and check:

2.	701	364	612	7687	8457	3997
	456	133	356	6426	3215	1476
	245	231	256	1261	5242	2521
3.	540	773	815	8889	8786	1566
	224	576	238	5378	7384	894
	316	197	577	3511	1402	672

4. At the store John spent $1.25, $.88, $2.50, and $.39. How much did John spend all together? $5.02

Multiply and check:

5.	217	124	167	238	253	104
	3	5	4	2	6	8
	651	620	668	476	1518	832
6.	379	208	456	250	309	432
	5	4	2	9	3	7
	1895	832	912	2250	927	3024

Divide and check: Have pupils use long form.

	29	95	83R3	68	69
7.	5)145	2)190	4)335	5)340	3)207
	73R3	93	87R2	87R1	76R2
8.	4)295	5)465	3)263	2)175	5)382

9. Find the sum of $4.15, $1.98, $2.50, and $.86. $9.49

More Practice. See ⑳ on page 319.

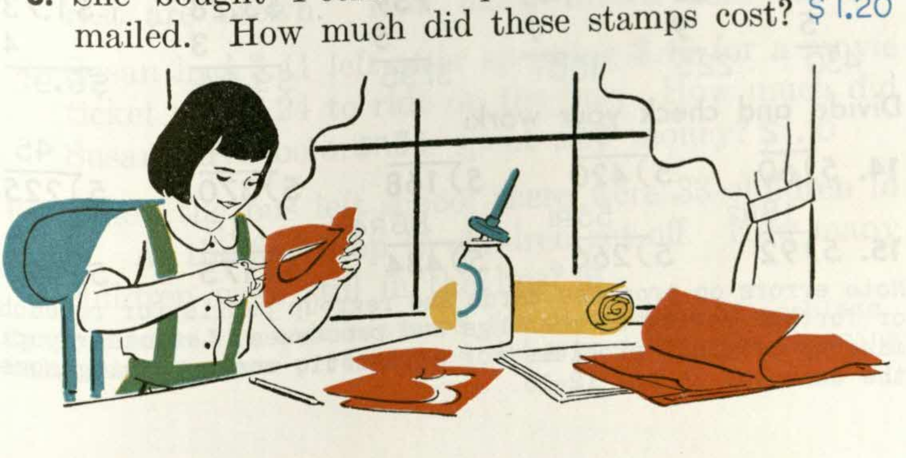
Observe pupils as they work. Note errors or hesitancy on progress cards. Work with pupils who did poorly and urge them to find own mistakes. Use "More Practice" for further review. Let other pupils work at arithmetic corner.

Present word problems involving different processes, and related to Valentine's Day. Develop awareness of problem solving as everyday activity; see G-44.

Susan's Valentines

1. Last February Susan made her own valentines. She spent \$.25 for heavy white paper, \$.40 for red paper, \$.60 for gold paper, and \$.35 for other things. How much did Susan spend? \$1.60

2. Susan bought 5 sheets of red paper. From each sheet she cut 12 large hearts. How many red hearts did Susan have? 60
3. She had 4 sheets of gold paper. From each one she cut 15 smaller hearts. How many gold hearts did Susan have? 60
4. How many hearts in all did Susan cut out? See the answers to ex. 2 and 3. 120
5. Susan used 1 red heart and 1 gold heart on each valentine. How many valentines did she make? 60
6. Susan had small pieces of gold paper left after she cut out the hearts. So she cut out 48 gold arrows. She put 1 arrow on as many valentines as she could. How many valentines did not have an arrow? 12
7. Susan sent half of the valentines by mail. How many valentines went by mail? 30
8. She bought 4-cent stamps for the valentines she mailed. How much did these stamps cost? \$ 1.20



See G-44 for correlation of examples with aims.

Chapter Review

1. Does water freeze when the temperature is 15°? Yes
2. Find the difference between $6.00 and $4.35. $1.65
3. How many nickels are equal to 40 pennies? 8
4. How many pennies are equal to 6 nickels? 30
5. How many fifths are there in one whole circle? Five
6. At $3 each, how much will 275 tickets cost? $825
7. A 5-pound roast of meat cost $4.25. Find the cost of 1 pound of meat. $.85
8. When the temperature drops from 65° to 36°, how many degrees does it drop? 29°

Find the answers:

9. $\frac{1}{5}$ of 30¢ 6¢ $\frac{1}{5}$ of 55¢ 11¢ $\frac{1}{5}$ of $345 $69 $\frac{1}{5}$ of $1.00 $.20

10. $\frac{1}{5}$ of 70¢ 14¢ $\frac{1}{5}$ of 80¢ 16¢ $\frac{1}{5}$ of $400 $80 $\frac{1}{5}$ of $3.75 $.75

11. What is the product for 5 × 24? 120 for 24 × 5? 120

Multiply and check your work:

12. $\begin{array}{r}37\\5\\\hline 185\end{array}$ $\begin{array}{r}90\\5\\\hline 450\end{array}$ $\begin{array}{r}112\\5\\\hline 560\end{array}$ $\begin{array}{r}245\\5\\\hline 1225\end{array}$ $\begin{array}{r}\$1.25\\7\\\hline \$8.75\end{array}$ $\begin{array}{r}\$3.04\\5\\\hline \$15.20\end{array}$

13. $\begin{array}{r}86\\5\\\hline 430\end{array}$ $\begin{array}{r}25\\9\\\hline 225\end{array}$ $\begin{array}{r}143\\7\\\hline 1001\end{array}$ $\begin{array}{r}759\\5\\\hline 3795\end{array}$ $\begin{array}{r}\$3.28\\3\\\hline \$9.84\end{array}$ $\begin{array}{r}\$1.73\\4\\\hline \$6.92\end{array}$

Divide and check your work:

14. $\begin{array}{r}12\\5\overline{)60}\end{array}$ $\begin{array}{r}84\\5\overline{)420}\end{array}$ $\begin{array}{r}33\text{R3}\\5\overline{)168}\end{array}$ $\begin{array}{r}74\\5\overline{)370}\end{array}$ $\begin{array}{r}45\\5\overline{)225}\end{array}$

15. $\begin{array}{r}18\text{R2}\\5\overline{)92}\end{array}$ $\begin{array}{r}53\text{R1}\\5\overline{)266}\end{array}$ $\begin{array}{r}86\text{R4}\\5\overline{)434}\end{array}$ $\begin{array}{r}35\\5\overline{)175}\end{array}$ $\begin{array}{r}78\\5\overline{)390}\end{array}$

Note errors on progress cards and regroup pupils for reteaching or further review of meanings and processes. Let other pupils make up original problems for arithmetic corner, using some of the examples in ex. 12–15.

A Problem Test

This is the third Problem Test. Try to have all your problems right. Each problem counts 10.

1. Tom sold 4 boxes of strawberries for $1.40. What was the price of 1 box of berries? $.35
2. In early morning the thermometer reading was 68°. By noon the reading was 81°. How many degrees had the temperature gone up? 13°
3. Jack sold 45 bunches of carrots. He put 8 carrots in each bunch. How many carrots did he put in bunches? 360
4. Ann looked at two bicycles in the store. The price of one was $39.95. The price of the other was $45.75. What was the difference in the prices? $5.80
5. Bill's lessons on the drum cost $3.50 each. Find the cost of 5 lessons on the drum. $17.50
6. In the circus parade Betty counted 15 elephants, 48 horses, 6 lions, 12 bears, and 24 dogs. How many animals in all did Betty count? 105
7. Dick tries to save $\frac{1}{3}$ of all the money he earns. How much will he save when he earns $2.25? $.75
8. Grandfather has 1250 hens. 735 are white. The rest are brown. How many brown hens has he? 515
9. Susan had $.41 left after spending $.45 for a movie ticket and $.24 to ride on the bus. How much did Susan have before she spent any money? $1.10
10. When the bus left school there were 33 children in it. At the first stop 15 children got off. How many children were still in the bus? 18

Group pupils who made mistakes for discussion of problems. Ask volunteers to name process used and give reason for choosing it.

Present diagnostic test of skills taught or review.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Page for that row.

Practice Pages

Add these numbers and check:

1. 7	9	6	66	86	84	94
5	3	8	23	58	59	
8	9	7	69	34	65	
6	4	7	32	25	43	
26	25	28	190	203	251	

Subtract and check the work:

2. 7789	9698	4699	1109	94
3584	2455	2197	533	
4205	7243	2502	576	

Multiply and check:

3. 203	113	270	349	861	56
4	5	3	2	4	
812	565	810	698	3444	
4. 128	346	175	259	492	93
5	5	5	4	5	
640	1730	875	1036	2460	

Divide and check:

60	21	71	90	
5. 5)300	5)105	5)355	5)450	102
27	89	36	49	
6. 5)135	5)445	5)180	5)245	105
$ .82R2¢	$ .86R1¢	$ .75R2¢	$ .76R2¢	
7. 4)$3.30	2)$1.73	5)$3.77	3)$2.30	113

Find the answers:

8. $\frac{1}{5}$ of 40 8	$\frac{1}{5}$ of 25 5	$\frac{1}{5}$ of 30 6	100

Compare results of test with previous ones (pages 116 and 118). Return papers to pupils and help them to analyze their errors. Let them think aloud as they do computation. Urge them to make self-assignments from practice pages.

See G-46 for specific aims of Chapter 4.

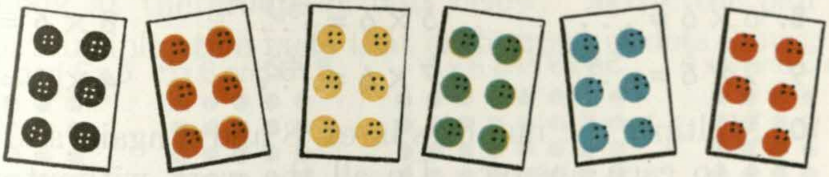
Chapter 4

How Many Buttons?

Develop readiness for multiplication facts of 6's.

The girls are dressing dolls to give away. They are sewing buttons on the doll clothes.

1. At the store Ann and Sally bought buttons for the doll dresses. There were 6 buttons on each card.



Ann said, "On 1 card there are 6 buttons; on 2 cards there are $\overset{12}{\ldots}$ buttons; on 3 cards there are $\overset{18}{\ldots}$ buttons." Look at the cards of buttons above and tell how many buttons there are on 4 cards; 24 on 5 cards; 30 6 cards. 36 Count, add, or multiply to find out.

2. Six 6's are 36. Then seven 6's are 6 more than 36, or $\overset{42}{\ldots}$. Seven 6's are $\overset{42}{\ldots}$. Then eight 6's are 6 more than $\overset{42}{\ldots}$, or $\overset{48}{\ldots}$.

Eight 6's are 48. Then nine 6's are 6 more than 48, or 54.

3. In the same way tell how many nine 6's are.

If needed, let some pupils use objects to arrange and count groups. Have different pupils show how to discover facts by addition.

The 6's in Multiplication

1. Learn these multiplication facts for the 6's. You already know the first six facts:

$$\begin{array}{cccccccccc} 6 & 6 & 6 & 6 & 6 & 6 & 6 & 6 & 6 & 6 \\ \underline{0} & \underline{1} & \underline{2} & \underline{3} & \underline{4} & \underline{5} & \underline{6} & \underline{7} & \underline{8} & \underline{9} \\ 0 & 6 & 12 & 18 & 24 & 30 & 36 & 42 & 48 & 54 \end{array}$$

2. Write the ten facts in ex. 1 with the sign ×, like this: 0 × 6 = 0, 1 × 6 = 6, and so on.

3. At 6¢ each, find the cost of 8 oranges. 8 x 6¢ = 48¢

4. At 6¢ each, find the cost of 9 stamps. 9 x 6¢ = 54¢

5. How many are five 6's? 30 seven 6's? 42 two 6's? 12 six 6's? 36

What numbers should be put in the spaces?

6. 3 × 6 = . . . 18 4 × 6 = . . . 24 1 × 6 = . . . 6

7. 7 × 6 = . . . 42 2 × 6 = . . . 12 9 × 6 = . . . 54

8. 6 × 6 = . . . 36 5 × 6 = . . . 30 8 × 6 = . . . 48

9. 9 × 6 = . . . 54 7 × 6 = . . . 42 4 × 6 = . . . 24

10. Multiply the numbers in ex. 8 and 9 again and add 4 to each answer. Do all the work without your pencil. The first one is (6 × 6) + 4, or 40. Ex. 8: 40, 34, 52; ex. 9: 58, 46, 28

11. Bob sells 6 eggs in a box. How many eggs does he put in 7 boxes? 42 in 9 boxes? 54 in 4 boxes? 24

12. Ann sells 6 candies in a bag. How many candies does she put in 5 bags? 30 in 8 bags? 48 in 6 bags? 36

13. Joe sells 6 apples in a basket. How many apples does he put in 2 baskets? 12 in 8 baskets? 48

14. Find the cost of 4 pencils at 6¢ each. 24 ¢

Have pupils verify new facts by adding. When facts are learned, have pupils enter them on multiplication tables. Daily activities, like those in ex. 10, are helpful to pupils when doing multiplication which involves carrying.

Teach reverses of multiplication facts for 6's.

Multiplying by 6

1. How many are 5 × 6? 30 Then how many are 6 × 5? 30 You see that 5 × 6 and 6 × 5 each have the same product, which is 30. They make a pair of facts.

2. What other fact goes with 7 × 6? 6 x 7 How many are 7 × 6? 42 How many are 6 × 7? 42

3. How many are 8 × 6? 48 6 × 8? 48 9 × 6? 54 6 × 9? 54

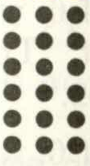
4. Here are the pairs of multiplication facts for the 6's. Cover the products and try to give them:

$$\begin{array}{cccccccccc} 6 & 0 & 6 & 1 & 6 & 2 & 6 & 3 & 6 & 4 \\ \underline{0} & \underline{6} & \underline{1} & \underline{6} & \underline{2} & \underline{6} & \underline{3} & \underline{6} & \underline{4} & \underline{6} \\ 0 & 0 & 6 & 6 & 12 & 12 & 18 & 18 & 24 & 24 \end{array}$$

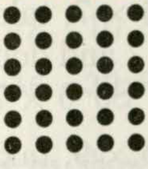
$$\begin{array}{ccccccccc} 6 & 5 & 6 & 7 & 6 & 8 & 6 & 9 & 6 \\ \underline{5} & \underline{6} & \underline{7} & \underline{6} & \underline{8} & \underline{6} & \underline{9} & \underline{6} & \underline{6} \\ 30 & 30 & 42 & 42 & 48 & 48 & 54 & 54 & 36 \end{array}$$

5. Look at the groups of dots below. Write the pair of multiplication facts that each group of dots shows:

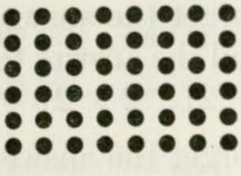
3 x 6 and 6 x 3



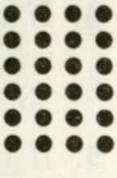
5 x 6 and 6 x 5



8 x 6 and 6 x 8



4 x 6 and 6 x 4



Find the answers: Use other facts in exercises similar to ex. 7–8.

6. (4 × 6) + 1 25 4 + (6 × 2) 16 (9 × 6) + 5 59

7. (6 × 9) + 4 58 6 + (7 × 6) 48 (6 × 0) + 3 3

8. One quart of ice cream will make 6 dishes of ice cream. How many dishes will 4 quarts make? 24 How many dishes will 6 quarts make? 36 7 quarts? 42

Have pupils prove answers to pairs of facts by addition (five 6's, then six 5's) or by arranging counters (5 groups of 6 each, then 6 groups of 5 each). Have pupils place the three new facts (6 × 7, 6 × 8, 6 × 9) on own tables.

Re-emphasize commutative principle. Introduce new help in multiplication (pages 124-125).

How to Help Yourself

1. Suppose you forget the answer for 6 × 8. Then reverse the numbers and see if you know the answer for 8 × 6. You remember that 8 × 6 = 48. What is the answer for 6 × 8? 48

2. What do you do if you forget the answer for 6 × 9? if you forget the answer for 6 × 7?

If you forget the answer to a multiplication fact, reverse the numbers. Then try to multiply them.

3. There is another way to help yourself if you forget the 6's facts. You know that 6 is twice as much as 3, so the answer for 6 × 8 is twice as much as the answer for 3 × 8. You know that 3 × 8 = 24, so 6 × 8 = 2 × 24, or 48.

4. If you forget the answer to 6 × 7, take $\frac{1}{2}$ of 6, which is 3. Find the answer to 3 × 7 and double it. Think, "3 × 7 = 21; 2 × 21 = 42. So 6 × 7 = 42."

5. If you forget the answer to 6 × 9, take $\frac{1}{2}$ of 6, which is 3. Find the answer to 3 × 9 and double it. Think, "3 × 9 = 27; 2 × 27 = 54. So 6 × 9 = 54." How do you think if you forget the answer to 6 × 6?
3x6=18; 2x18=36, so 6x6=36

If you cannot multiply by 6, multiply by $\frac{1}{2}$ of 6, which is 3. Then double the answer.

The new help in multiplication should not be memorized. It is presented to develop appreciation of our number system. The more advanced pupils will grasp the idea quickly and probably extend it to multiplication by 12.

More Help

1. If you forget the answer to a multiplication fact with 4 in it, like 4×5, you can help yourself to get the answer. You know that 4 is twice as much as 2, so 4×5 is twice as much as 2×5. You know that $2 \times 5 = 10$, so $4 \times 5 = 20$.

2. If you forget the answer to 4×7, take $\frac{1}{2}$ of 4, which is 2. Then find the answer to 2×7 and double it. Think, "$2 \times 7 = 14$; $2 \times 14 = 28$. So $4 \times 7 = 28$."

3. If you forget 4×6, try 2×6 and double the answer. Think, "$2 \times 6 = 12$; $2 \times 12 = 24$. So $4 \times 6 = 24$."

Give the numbers that go in the spaces:

4. $2 \times 8 =$ ...16..., so $4 \times 8 =$ ...32...

5. $2 \times 7 =$ ...14..., so $4 \times 7 =$ ...28...

6. $2 \times 9 =$ ...18..., so $4 \times 9 =$ ...36...

Double these numbers. Do the work mentally.

7. 12 24 21 42 10 20 16 32 24 48 27 54 14 28

8. 20 40 18 36 32 64 12 24 15 30 36 72 28 56

Find the answers as shown on page 124 and above:

9. 4 × 5 20 4 × 4 16 4 × 9 36 4 × 7 28

10. 6 × 4 24 6 × 7 42 6 × 8 48 6 × 9 54

If you cannot multiply by 4, multiply by $\frac{1}{2}$ of 4, which is 2. Then double the answer.

Urge better pupils to complete those exercises where applications of the rule are found. Emphasize that pupils can discover answers to facts by these various methods.

Using 6 in Multiplication

Multiply each number by 6. Check by going over your work:

1. 20 120 101 606 113 678 220 1320 117 702 238 1428
2. 42 252 316 1896 125 750 478 2868 259 1554 706 4236
3. 39 234 240 1440 694 4164 576 3456 180 1080 983 5898
4. 15 90 604 3624 357 2142 890 5340 648 3888 795 4770

5. There is room for 46 children in each school bus. How many children could ride to Blue Island in 4 busses? 184

6. To take more children to Blue Island there were 14 cars. Six children rode in each car. How many children went in the cars? 84

7. How many children went to Blue Island by bus and by car? See the answers to ex. 5 and 6.
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Multiply. Check your work by going over it:

8.	66 5 330	216 6 1296	160 9 1440	115 6 690	636 2 1272	206 8 1648
9.	72 6 432	606 4 2424	387 6 2322	326 7 2282	430 6 2580	666 3 1998
10.	24 6 144	109 6 654	162 5 810	106 6 636	153 6 918	366 7 2562
11.	46 3 138	847 6 5082	286 6 1716	600 4 2400	462 8 3696	592 6 3552

More Practice. See ㉑ on page 320.

After checking papers, group pupils who made mistakes. Urge pupils to determine if errors were caused by facts or some step in the process. Have them think aloud as they do the computation to check this.

Develop awareness of use of arithmetic in cooking

Making Popcorn Balls

1. Ann, Peggy, and Susan popped a large bowl full of popcorn. Then they made popcorn balls. For the sirup, Ann said to put these things in a pan and boil them:

1 tablespoon butter
1 cup brown sugar
4 tablespoons water

Peggy said they had so much popcorn they should make more sirup. They decided to use 2 times as much butter, sugar, and water. How much of each thing did they use? 2 tablespoons butter, 2 cups brown sugar, 8 tablespoons water

2. The girls boiled the butter, sugar, and water from 3:58 until 4:05. How many minutes was that? 7

3. Susan poured the sirup slowly over the popcorn and mixed it well. Then the girls shaped it into balls. Ann made 9 balls, Peggy made 11, and Susan made 7. How many popcorn balls did they make all together? 27

4. The girls shared the popcorn balls equally. How many popcorn balls did each girl get? 9

If possible, perform actual cooking experiment as described. Additional problems will arise during project which may change some facts found in ex. 1–4. Discuss with pupils other applications of arithmetic in cooking.

Provide oral and comprehensive written review of addition and subtraction.

Review Practice

Give the answers. Watch the signs:

1. 32 ÷ 4 8   14 − 5 9   (5 × 6) + 3 33 $\frac{1}{3}$ of 27 9

2. 35 + 8 43   30 ÷ 5 6   (6 × 8) + 4 52 $\frac{1}{5}$ of 40 8

3. 16 − 9 7   42 + 9 51   (4 × 6) + 2 26 $\frac{1}{2}$ of 14 7

4. 45 ÷ 5 9   15 − 7 8   (6 × 9) + 5 59 $\frac{1}{4}$ of 28 7

5. 18 ÷ 3 6   24 ÷ 4 6   (6 × 7) + 1 43 $\frac{1}{3}$ of 15 5

Copy in columns, add, and check:

6. 286 + 103 389   147 + 89 236   28 + 37 + 15 80

7. 473 + 259 732   254 + 28 282   37 + 48 + 29 114

8. 196 + 406 602   649 + 42 691   89 + 23 + 42 154

9. 529 + 876 1405   389 + 58 447   62 + 45 + 48 155

10. Find the difference between 63 tickets Jack sold and 54 tickets Ann sold. 9 tickets

11. Jack had \$15.75 to turn in for tickets. Ann had \$13.50. How much money did both children turn in for the tickets? \$29.25

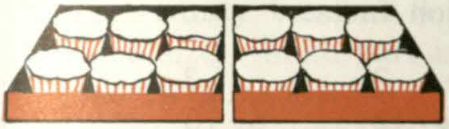
Subtract and check: Use folded-paper method (page 328).

12.	978	548	632	9509	8500	1181
	605	429	173	8130	2354	327
	373	119	459	1379	6146	854
13.	737	916	672	2500	7949	9419
	474	488	124	2047	1687	1449
	263	428	548	453	6262	7970
14.	700	577	495	4149	1380	5276
	361	269	478	3571	836	2855
	339	308	17	578	544	2421

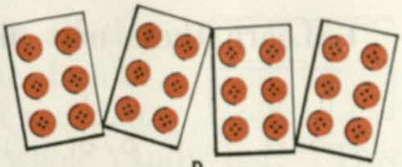
Do ex. 1-5 orally, urging pupils to respond quickly. Brighter pupils may do ex. 6-11 orally also. Plan for drill on facts or further review based on class or individual needs.

Develop readiness for even division facts of 6's.

Learning New Division Facts



A

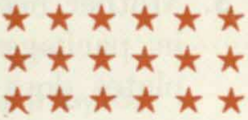


B

1. Mother bought 12 cupcakes. They came in packages of 6 cakes each. How many packages did she buy? 2 Look at A above to find how many packages are needed to give 12 cakes.

2. Mother bought cards of buttons with 6 buttons on each card. How many cards did she need to get 24 buttons? 4 How many 6's make 24? 4 See B above.

3. How many stars do you see at C? 18 How many stars are there in 1 row? 6 How many 6's make 18? 3 How many are 18 ÷ 6? 3



C

4. Draw 30 dots on paper. Then draw a circle around every 6 dots to divide the dots into equal groups. How many circles did you draw? 5 How many 6's make 30? 5 How many are 30 ÷ 6? 5

5. You do not need to draw dots in groups of 6 if you know the multiplication facts for 6. Jack thinks, "7 × 6 = 42, so there are seven 6's in 42." What does 42 ÷ 6 equal? 7

Tell what numbers should be put in the spaces:

6. . .6. × 6 = 36, so there are .6. 6's in 36.

7. . .9. × 6 = 54, so there are .9. 6's in 54.

8. . .8. × 6 = 48, so there are .8. 6's in 48.

Follow development as done in ex. 1–8. Have pupils check doubtful answer by referring to multiplication charts. Let some pupils show subtractive way of discovering facts (6 can be subtracted from 30 five times).

Teach even division facts of 6's.

Dividing by 6

1. Learn these new division facts:

$\begin{array}{r}0\\6\overline{)0}\end{array}$ $\begin{array}{r}1\\6\overline{)6}\end{array}$ $\begin{array}{r}2\\6\overline{)12}\end{array}$ $\begin{array}{r}3\\6\overline{)18}\end{array}$ $\begin{array}{r}4\\6\overline{)24}\end{array}$

$\begin{array}{r}5\\6\overline{)30}\end{array}$ $\begin{array}{r}6\\6\overline{)36}\end{array}$ $\begin{array}{r}7\\6\overline{)42}\end{array}$ $\begin{array}{r}8\\6\overline{)48}\end{array}$ $\begin{array}{r}9\\6\overline{)54}\end{array}$

2. Write the division facts in ex. 1, using the sign ÷. For example, 12 ÷ 6 = 2, 18 ÷ 6 = 3, and so on.

3. How many 6-cent stamps can I buy for 30¢? 5

4. At 6¢ each, how many oranges can I buy for 24¢? 4

5. Mother needs 18 paper plates. She can buy them in packages of 6 each. How many packages of plates does Mother need? 3

6. For a school party we need ice cream for 48 people. We can get 6 dishes from each quart. How many quarts do we need? 8 How many gallons is this? 2

Tell what numbers should be put in the spaces:

7. . .3. 6's = 18 . .9. 6's = 54 . .6. 6's = 36

8. . .8. 6's = 48 . .5. 6's = 30 . .7. 6's = 42

9. . .2. 6's = 12 . .4. 6's = 24 . .9. 6's = 54

Give the answers:

10. 54 ÷ 6 9 18 ÷ 6 3 36 ÷ 6 6 42 ÷ 6 7

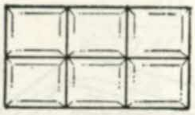
11. 12 ÷ 6 2 6 ÷ 6 1 30 ÷ 6 5 18 ÷ 6 3

12. 42 ÷ 6 7 48 ÷ 6 8 24 ÷ 6 4 54 ÷ 6 9

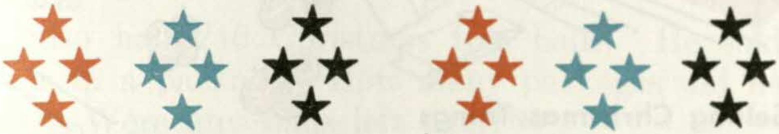
Have pupils prove facts in ex. 1 and ex. 10-12 by giving corresponding multiplication facts. Have pupils use facts in original problems to check understandings. Make flash cards for individual practice and drill.

Teach how to find $\frac{1}{6}$ of a number.

One Sixth



1. This candy bar has 6 parts all the same size. Each part is **one sixth** of the whole candy bar. You see that there are 6 sixths in the whole candy bar. This shows that $\frac{6}{6} = 1$.



2. Here are 24 stars divided into 6 equal groups. What is each group called? One sixth How many are $\frac{1}{6}$ of 24 stars? 4 How many are $\frac{1}{6}$ of 24? 4 How many are $24 \div 6$? 4

Stress.

To find $\frac{1}{6}$ of a number, divide it by 6.

3. On paper draw 18 dots, putting them one at a time into 6 equal groups. How many dots are there in each group? 3 How many are $\frac{1}{6}$ of 18 dots? 3 How many are $\frac{1}{6}$ of 18? 3 How many are $18 \div 6$? 3

4. How many are $\frac{1}{6}$ of 12 eggs? 2 $\frac{1}{6}$ of 36 eggs? 6

5. Find $\frac{1}{6}$ of 48¢; 8¢ $\frac{1}{6}$ of 30¢; 5¢ $\frac{1}{6}$ of 54¢. 9¢

6. How many are $\frac{1}{6}$ of \$42? \$7 $\frac{1}{6}$ of \$6? \$1 $\frac{1}{6}$ of \$18? \$3

7. How many are $\frac{1}{6}$ of \$660? \$110 $\frac{1}{6}$ of \$186? \$31

8. Uncle Jack has 24 oranges. If he gives $\frac{1}{6}$ of them to Bill, how many oranges will Bill get? 4 If he gives $\frac{1}{4}$ of them to Bill, how many will Bill get? 6 Is $\frac{1}{6}$ of 24 more or less than $\frac{1}{4}$ of 24? Less

Use flannelboard and fractional parts to show $\frac{1}{6}$ of single object. Stress equality of parts. Then use objects liberally to develop concept that finding $\frac{1}{6}$ of number is same as dividing it by 6.

Teach division of 3-figure numbers by 6, with remainders.

Selling Christmas Things

Ben bought Christmas tree bells, balls, and stars to sell before Christmas. He put them in small packages to sell at a low price.

1. **Problem** Ben had 125 Christmas bells. He put 6 bells in a package. How many packages did Ben make? 20 Were any bells left over? Yes, 5

Explanation You must divide 125 by 6.

$$\begin{array}{r} 20 \\ 6\overline{)125} \\ 12 \\ \hline 5 \\ 0 \\ \hline 5 \end{array}$$

Divide 12 tens by 6. This gives 2 tens. Write 2 in the quotient over the 2 of 12 tens. Multiply 6 by 2, which gives 12. Write 12 under 12 and subtract. This gives 0, but do not write 0. Bring down 5 ones.

Check

$$\begin{array}{r} 20 \\ 6 \\ \hline 120 \\ 5 \\ \hline 125 \end{array}$$

Divide 5 ones by 6, which gives 0. Write 0 in the quotient over 5. Multiply 6 by 0, which gives 0. Write 0 under 5 and subtract. This gives a remainder of 5. The quotient is 20. Ben made 20 packages of bells and had 5 bells left for himself.

Remember to write a figure in the quotient each time you bring down a new figure in the work. Stress.

In ex. 1, have pupils explain why 12 tens and not 1 hundred are divided by 6. Stress place value of all figures and proper placement of quotient figures. Ask why zero is not needed after first subtraction, but is needed in ones place.

2. Study each of the examples below:

$$\begin{array}{r} 31 \\ 6\overline{)186} \\ \underline{18} \\ 6 \\ \underline{6} \\ \end{array} \qquad \begin{array}{r} 50\text{ R3} \\ 6\overline{)303} \\ \underline{30} \\ 3 \\ \underline{0} \\ 3 \end{array} \qquad \begin{array}{r} 71\text{ R1} \\ 6\overline{)427} \\ \underline{42} \\ 7 \\ \underline{6} \\ 1 \end{array} \qquad \begin{array}{r} 40 \\ 6\overline{)240} \\ \underline{24} \\ 0 \\ \underline{0} \\ \end{array}$$

3. Ben also had 240 Christmas tree balls. He sold 4 balls in a package. How many packages did he make? 60 Were any balls left over? No

4. Ben had 144 large stars. He sold them in pairs. How many pairs of large stars did he have? 72 How many things are there in a pair? 2

5. There were 256 small stars. Ben sold 5 small stars together in a package. How many packages of small stars did he have? 51 Were any small stars left over? Yes, 1

Divide as in ex. 2 and check:

6. $\overset{71\text{R}2}{5\overline{)357}}$ $\overset{80\text{R}1}{3\overline{)241}}$ $\overset{20}{6\overline{)120}}$ $\overset{40\text{R}1}{4\overline{)161}}$ $\overset{50\text{R}1}{2\overline{)101}}$

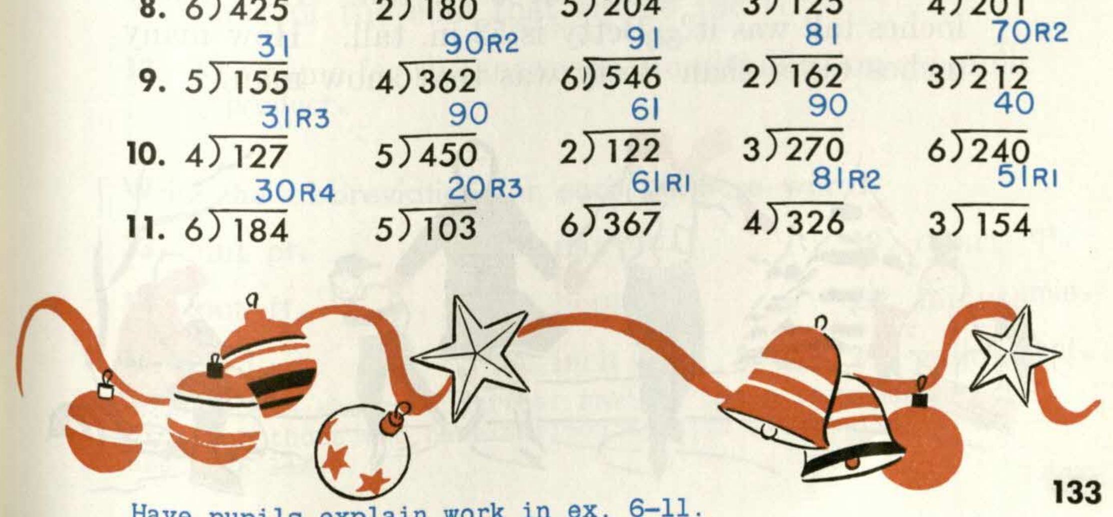
7. $\overset{70\text{R}3}{4\overline{)283}}$ $\overset{51\text{R}3}{6\overline{)309}}$ $\overset{70\text{R}1}{2\overline{)141}}$ $\overset{61}{5\overline{)305}}$ $\overset{60\text{R}1}{3\overline{)181}}$

8. $\overset{70\text{R}5}{6\overline{)425}}$ $\overset{90}{2\overline{)180}}$ $\overset{40\text{R}4}{5\overline{)204}}$ $\overset{41\text{R}2}{3\overline{)125}}$ $\overset{50\text{R}1}{4\overline{)201}}$

9. $\overset{31}{5\overline{)155}}$ $\overset{90\text{R}2}{4\overline{)362}}$ $\overset{91}{6\overline{)546}}$ $\overset{81}{2\overline{)162}}$ $\overset{70\text{R}2}{3\overline{)212}}$

10. $\overset{31\text{R}3}{4\overline{)127}}$ $\overset{90}{5\overline{)450}}$ $\overset{61}{2\overline{)122}}$ $\overset{90}{3\overline{)270}}$ $\overset{40}{6\overline{)240}}$

11. $\overset{30\text{R}4}{6\overline{)184}}$ $\overset{20\text{R}3}{5\overline{)103}}$ $\overset{61\text{R}1}{6\overline{)367}}$ $\overset{81\text{R}2}{4\overline{)326}}$ $\overset{51\text{R}1}{3\overline{)154}}$



Have pupils explain work in ex. 6–11.

Review some concepts and skills in word problems.

Fun in Winter

1. Mr. Brown has a small pond near his house. He paid Tom and Bill $4.20 to shovel the snow off the ice. The boys divided the money equally. What was each boy's share? $2.10

2. It took the boys 3 hr. to clear the snow off the ice. How much an hour did each boy get? $.70 See ex. 1.

3. Mary is learning to skate. With her Christmas money she bought new skates for $4.95 and a cap for $1.25. How much did Mary pay for these things? $6.20

4. Yesterday the temperature was 10° above zero at 7 A.M. Was that cold enough to freeze water? Yes How much below the freezing point is 10°? 22°

5. It is fun to ride downhill in winter. Last winter there was snow from December 17 to February 18. Find the number of weeks on a calendar. 9

6. Last winter the ice was good for skating only 4 da. in December, 17 da. in January, and 7 da. in February. How many days of skating were there? 28

7. When there is snow Bob and Betty make snow men. Last week they made one 5 ft. tall. How many inches tall was it? 60 Betty is 53 in. tall. How many inches taller than Betty was that snow man? 7

Test vocabulary words by means of completion test.

Do You Know the Right Word?

Tell the right word that goes in each space. On your paper try to write the word:

1. 12 o'clock at night is called ... midnight.

2. The numbers $\frac{1}{5}$, $\frac{1}{2}$, $\frac{1}{4}$ are called ... fractions.

3. Temperature is measured in ... degrees.

4. $18 \div 6 = 3$ is called a division ... fact.

5. The name of the coin that equals 25¢ is ... quarter.

6. The measure used in selling ribbon is the ... yard.

7. The name for the answer to a subtraction example is ... remainder or ... difference.

8. The short way to write inch is in. In. is called an ... abbreviation.

9. The name for the answer to an addition example is ... sum.

10. The name for the answer to a division example is ... quotient.

11. The name of the coin that equals 5¢ is ... nickel; the name of the coin that equals 10¢ is ... dime.

12. The name for the answer to a multiplication example is ... product.

Write the abbreviation for each of these words:

13. pint pt.

14. foot ft.

15. yard yd.

16. day da.

17. hour hr.

18. inch in.

19. quart qt.

20. minute min.

21. gallon gal.

Group pupils who need further review. Let others make study cards for those who have difficulty with arithmetic terms (see page 114).

Teach uneven division facts for the 6's.

How Many Are Left Over?

1. Problem Mary has cut out 50 pieces of pink paper. She uses 6 pieces for each flower she makes. How many flowers will 50 pieces make? 8 R2

Explanation Mary knows that eight 6's make 48. So she writes 8 above the 0 of 50. Then she multiplies 6 by 8, which gives 48. She writes 48 under 50 and subtracts. The remainder is 2. Mary knows she can make 8 flowers and have 2 pieces of paper left over.

$$\begin{array}{r} 8\text{ R}2 \\ 6\overline{)50} \\ \underline{48} \\ 2 \end{array}$$

2. How many flowers like those in ex. 1 can Mary make from 43 pieces? 7 R1, or 7 flowers from 22 pieces? 3 R4, or 3 flowers

Find the answers. Do the work as in ex. 1:

	6R5	5R4	8R5	7R3	4R5	8R3	0R5
3.	$6\overline{)41}$	$6\overline{)34}$	$6\overline{)53}$	$6\overline{)45}$	$6\overline{)29}$	$6\overline{)51}$	$6\overline{)5}$
	3R4	9R1	9R5	2R2	2R1	6R3	1R3
4.	$6\overline{)22}$	$6\overline{)55}$	$6\overline{)59}$	$6\overline{)14}$	$6\overline{)13}$	$6\overline{)39}$	$6\overline{)9}$
	5R1	4R2	5R5	9R2	4R1	8R1	0R1
5.	$6\overline{)31}$	$6\overline{)26}$	$6\overline{)35}$	$6\overline{)56}$	$6\overline{)25}$	$6\overline{)49}$	$6\overline{)1}$

6. Jack had 45 plants to put in 6 equal rows in his garden. How many plants did he put in each row? 7 Were any plants left over? Yes, 3

7. Ann gave the man a quarter for bus tickets at 6¢ each. How many did she get? 4 Did she get change? Yes, 1¢

Divide each number by 6:

8. 44 7R2 17 2R5 52 8R4 20 3R2 33 5R3 27 4R3 58 9R4 3 0R3

9. 50 8R2 37 6R1 46 7R4 57 9R3 38 6R2 23 3R5 43 7R1 8 1R2

10. 32 5R2 40 6R4 16 2R4 28 4R4 11 1R5 47 7R5 21 3R3 2 0R2

Be sure pupils compare remainders with divisors to check whether quotient figure is correct. Stress that remainder must always be smaller than divisor. Remind pupils of helping numbers (next smaller number that can be divided by 6 evenly).

Provide practice in division of 3-figure numbers by 6.

Cookies to Sell

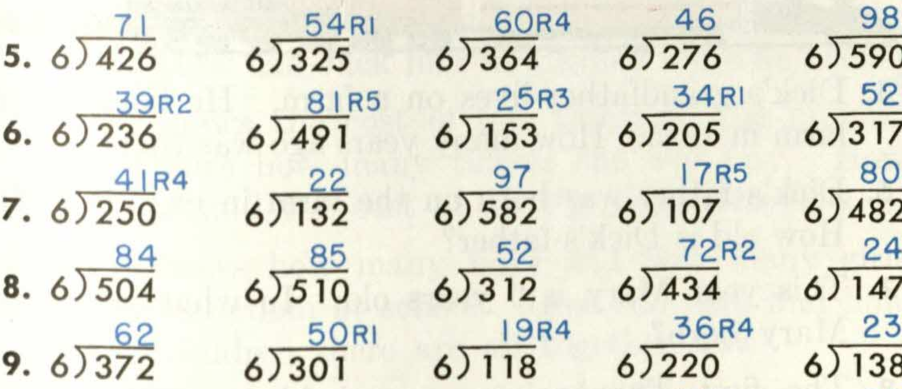
1. The girls put 6 cookies in each package they sell. Today they have 92 cookies to put in packages. How many packages can they make? 15 Will they have any cookies left over? 2

2. Last week several girls made 150 cookies in all. If they put 6 cookies in each package, how many packages did they have? 25

3. One day the cooking class made 253 cookies. How many packages of 6 cookies each did they have? 42 R1

Divide. Check your work by multiplying: Use long form.

4.	$\overset{57}{6\overline{)342}}$	$\overset{33}{6\overline{)198}}$	$\overset{79\text{R}1}{6\overline{)475}}$	$\overset{93\text{R}4}{6\overline{)562}}$	$\overset{29\text{R}1}{6\overline{)175}}$
5.	$\overset{71}{6\overline{)426}}$	$\overset{54\text{R}1}{6\overline{)325}}$	$\overset{60\text{R}4}{6\overline{)364}}$	$\overset{46}{6\overline{)276}}$	$\overset{98\text{R}2}{6\overline{)590}}$
6.	$\overset{39\text{R}2}{6\overline{)236}}$	$\overset{81\text{R}5}{6\overline{)491}}$	$\overset{25\text{R}3}{6\overline{)153}}$	$\overset{34\text{R}1}{6\overline{)205}}$	$\overset{52\text{R}5}{6\overline{)317}}$
7.	$\overset{41\text{R}4}{6\overline{)250}}$	$\overset{22}{6\overline{)132}}$	$\overset{97}{6\overline{)582}}$	$\overset{17\text{R}5}{6\overline{)107}}$	$\overset{80\text{R}2}{6\overline{)482}}$
8.	$\overset{84}{6\overline{)504}}$	$\overset{85}{6\overline{)510}}$	$\overset{52}{6\overline{)312}}$	$\overset{72\text{R}2}{6\overline{)434}}$	$\overset{24\text{R}3}{6\overline{)147}}$
9.	$\overset{62}{6\overline{)372}}$	$\overset{50\text{R}1}{6\overline{)301}}$	$\overset{19\text{R}4}{6\overline{)118}}$	$\overset{36\text{R}4}{6\overline{)220}}$	$\overset{23}{6\overline{)138}}$
10.	$\overset{19}{6\overline{)114}}$	$\overset{75}{6\overline{)450}}$	$\overset{48\text{R}2}{6\overline{)290}}$	$\overset{90\text{R}1}{6\overline{)541}}$	$\overset{35}{6\overline{)210}}$



Observe pupils who hesitate or seem to have difficulty and group them for reteaching or drill on facts. Have them think aloud as they do the computations to determine cause of errors.

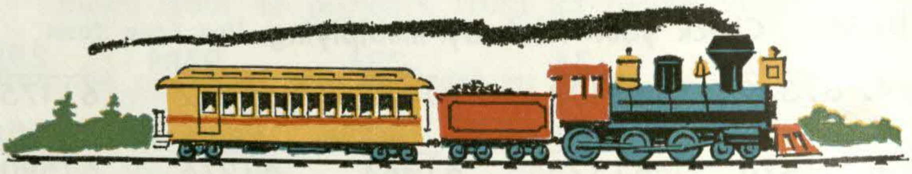
Teach how to calculate elapsed time. See G-50 for further extension of skill.

How Long Ago Was That?

1. Jack goes to school in an old building. It was built in 1925. How many years ago was that?

   ▶ To find the number of years, subtract the year the school was built from the present year.

2. This year Ann's father will be 37 years old. In what year was Ann's father born?
3. The oldest house in Greenfield is 185 years old this year. In what year was that house built?
4. The first railroad to Green Island was finished in 1856. How many years ago did the railroad come to Green Island?



5. Dick's grandfather lives on a farm. He bought the farm in 1915. How many years ago was that?
6. Dick's father was born on the farm in ex. 5 in 1929. How old is Dick's father?
7. This year Mary is 9 years old. In what year was Mary born?
8. The first Thanksgiving was held in 1621. How many years ago was the first Thanksgiving Day?
9. Bill White was born in the year 1948. How old is Bill this year?
10. Peggy's birthday comes on August 27. If it is now October 22, how many weeks ago was Peggy's birthday? 8 Use a calendar to find out.

Do problems orally with pupils, after demonstrating ex. 1 rule on board. Let different pupils read a problem, let another translate it into symbolic language on board, then have class solve it. Ex. 2-3 may need further explanation by you.

Urge all pupils to determine process used by looking for meaning of whole problem and key terms. Then let different pupils give their answers, telling why process was chosen.

Problems without Numbers

Tell whether you add, subtract, multiply, or divide to work each problem: Later, let pupils suggest sensible numbers to use in ex. 1–8, and re-solve problems.

1. Betty knows the cost of each thing she bought at the store. How can she find how much all the things cost? Add

2. Bill knows how many pennies he has. How can he find how many nickels he can get for the pennies? Divide

3. Mother knows how many cookies she can bake in one pan. How can she find the number of cookies she can bake in several pans of the same size? Multiply

4. Mary knows how many feet of ribbon she needs. How can she find how many yards of ribbon to buy? Divide

5. Jack knows how much a new bicycle tire costs. He knows the money he has is not enough to buy the tire. How can Jack find how much more he needs? Subtract

6. Jane knows the cost of one ticket to the movies. She knows how many tickets she will buy. How can she find the cost of all the tickets? Multiply

7. Ann knows how many boys and how many girls are in her room at school. How can Ann find how many children there are all together? Add

8. Andy knows how many boys are to share the cost of a boat. He also knows the cost of the boat. How can he find each boy's share of the cost? Divide

Teach division involving 3-figure quotients, with and without carrying.

Three-Figure Quotients

1. **Problem** The 6 schools in Pleasant City will try to sell 1350 tickets for the Christmas play. Each school has the same number of tickets to sell. How many tickets has each school? 225

Explanation Study the work at the right. You see the first quotient figure is 2. After you get the first quotient figure, write a new figure in the quotient every time you bring down a figure. There are three figures in the quotient in this example. The answer is 225, so each school has 225 tickets to sell.

$$\begin{array}{r} 225\\ 6\overline{)1350}\\ \underline{12}\\ 15\\ \underline{12}\\ 30\\ \underline{30} \end{array}$$

2. Four boys bought a package of paper together. They divided equally the 500 sheets of paper in it. How many sheets of paper did each boy get? 125

Divide and check your work: Have pupils explain computations.

3.	154 $6\overline{)924}$	245 $6\overline{)1470}$	962R2 $3\overline{)2888}$	393R2 $4\overline{)1574}$	531R2 $5\overline{)2657}$
4.	395 $2\overline{)790}$	639 $6\overline{)3834}$	754R1 $4\overline{)3017}$	819 $3\overline{)2457}$	767R1 $2\overline{)1535}$
5.	156R3 $4\overline{)627}$	445R2 $3\overline{)1337}$	785R4 $5\overline{)3929}$	819 $6\overline{)4914}$	293R1 $4\overline{)1173}$
6.	327R1 $3\overline{)982}$	212R3 $6\overline{)1275}$	895 $4\overline{)3580}$	859R1 $2\overline{)1719}$	968 $3\overline{)2904}$
7.	134R3 $5\overline{)673}$	975 $6\overline{)5850}$	578 $3\overline{)1734}$	498R1 $5\overline{)2491}$	689 $4\overline{)2756}$

Divide each number by 6: Use long form.

8.	139R4 838	548R3 3291	613R3 3681	267R2 1604	873R1 5239	527R2 3164
9.	154R1 925	428R4 2572	918 5508	613R1 3679	781 4686	231R4 1390

In discussion of ex. 1, stress reasons for placement of quotient figures (dividing hundreds gives hundreds, and so on). Stress place value, and be sure pupils understand exchange of thousands for hundreds, and so on.

Present oral review of terms, concepts, and skills.

Oral Practice

Give the answers. Do not use your pencil:

1. 36 ÷ 6 6 8 × 6 48 14 + 7 21 (5 × 6) + 4 34

2. 40 − 5 35 9 + 7 16 54 ÷ 6 9 (6 × 9) + 3 57

3. 31 ÷ 6 5R1 6 × 7 42 20 − 7 13 (6 × 4) + 5 29

4. 23 − 9 14 7 + 8 15 19 ÷ 6 3R1 (6 × 6) + 2 38

5. 25 ÷ 4 6R1 9 × 6 54 83 − 9 74 (6 × 2) + 4 16

6. Tell what words these abbreviations stand for:
minute(s) quart(s) hour(s) foot(feet)
min. yd. qt. in. hr. gal. ft.
yard(s) inch(es) gallon(s)

7. Tell which of these fractions is the largest. Then tell which is the next largest, and so on to the smallest: $\frac{1}{5}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{4}$. Largest to smallest: $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$

8. Suppose you have no coins larger than a quarter. To pay for a 50-cent ticket without making change, you might use . 10 . nickels; or . 5 . dimes; or . 2 . quarters; or 1 quarter, . 2 . dimes, and . 5 . pennies.

9. Measure the following by quarts or by feet. Tell which measure you would use for each: cloth, milk,
feet quarts
quarts quarts feet quarts feet feet
paint, ice cream, ribbon, cream, a board, rope.

10. When \$2.61 is shared by 4 girls, the quotient is \$.65 with a remainder of 1. Does this remainder stand for \$1, 1¢, or 1 girl? 1¢

In ex. 11–13, look at a clock to get the answers:

11. How many minutes between 7:30 A.M. and 7:56 A.M.? 26

12. How many minutes between 8:15 A.M. and 9:05 A.M.? 50

13. How many minutes between 5:40 P.M. and 6:08 P.M.? 28

Extend review in ex. 1-5 and use as game activity, dividing class into teams. Use review to spot-check for class or individual weaknesses, and group for remedial work. Let others work at arithmetic corner.

Present word problems dealing with winter trip.

A Winter Trip

1. Mr. and Mrs. Hall took Bob and Betty to Florida last winter. They left on December 9 and came home on December 30. How many weeks were they away? 3 Look at a calendar.

2. When the Halls left home there was snow on the ground. The temperature was 24°. In Florida the temperature was 73°. How many degrees warmer was it in Florida than at home? 49° Do you think the Hall children could skate on Christmas? No Was it warm enough for Bob and Betty to go swimming? Yes

3. Look at a thermometer at school or at home today. Then tell how much higher or lower than 73° the temperature is where you are.

4. Bob and Betty read that Florida was discovered in 1513. How many years ago was that?

5. The children also read that the oldest city in Florida was settled in 1565. How many years ago was that oldest city settled?

6. The Halls made a trip to see the Singing Tower. It is in a bird park. The tower is 205 ft. high. Do you know of anything that is about 205 ft. high? How many feet high is the flagpole at your school?

Urge pupils to read problems carefully keeping questions in mind, that is, what does problem ask them to find, what facts are known, what process should be used, how should problem be written in numerical form.

7. One day the Halls fished in the ocean. Bob caught a fish that weighed 5 pounds. Betty caught one that weighed 4 pounds. How many pounds did the two fish together weigh? 9

8. Betty read about a very large fish that was caught off the coast of Florida. It weighed 350 pounds. Was this fish 50 times, or 60 times, or 70 times as large as Bob's fish? 70 See ex. 7.

9. At a big zoo, the Halls saw two very large turtles. One turtle weighed 145 pounds. The other turtle weighed 227 pounds. What was the difference in their weights? 82 pounds

10. There are 30,000 lakes in Florida. You have not yet learned to read numbers as large as this. How many places does it have? 5 Can you read it? Thirty thousand

Have pupils make up and illustrate own problems about trips they have taken for class to discuss and solve.

Problems

1. Sally is painting a poster for Safety Week. It is 18 in. wide and 2 ft. long. How many inches long is it? 24

2. To make the poster Sally used a sheet of cardboard 24 in. long by 20 in. wide. How many inches did Sally cut off the cardboard to make it just 18 in. wide? 2 How many inches did she cut off to make it 24 in. long? 0

3. Sally paid $.35 for the cardboard, $.69 for paint, and $.39 for a brush. How much did she spend? $1.43

4. Sally gave the man $2.00 to pay for the things she bought in ex. 3. How much change did she get? $.57

5. The boys printed 850 tickets for the school play. Only 19 tickets were not sold. How many tickets were sold for the play? 831

6. Dog food costs 19¢ a can. Jim bought 6 cans of it. How much did the dog food cost? $1.14

7. Mother baked 450 Christmas cookies. She put them in 6 boxes, with the same number of cookies in each box. How many cookies were there in each box? 75

8. Ben saves $\frac{1}{3}$ of the money he earns. How much should he save when he earns $2.25? $.75 when he earns $1.50? $.50 when he earns $.75? $.25 when he earns $1.95? $.65

See suggestions for page 142. Group pupils for further work of this type if they have difficulties.

Extend teaching of 3-figure quotients to include dollars and cents.

Buying a Dog

1. **Problem** The 3 Wood boys bought a dog for $25.00. They shared the cost equally. How much did each boy pay? $8.33 How many boys paid an extra cent?

Explanation When you have to divide dollars and cents, be sure to put the first quotient figure in the right place. Why do you write 8 over the 5 of 25 and not over the 2 of 25? When you have found all the quotient figures, put the decimal point in the quotient right above the decimal point in $25.00. The answer is $8.33 with a remainder of 1¢. If each boy paid $8.33, they would be 1¢ short of $25.00. How many boys had to pay an extra cent?

```
   $8.33 R1¢
3)$25.00
   24
    1 0
      9
     10
      9
      1
```

2. The boys paid $5.00 for a case of dog food. They shared the cost of that too. How much did each boy pay? $1.66 How many boys paid an extra cent this time? 2 How much in all did each boy pay? One paid $1.66, two paid $1.67 each.

Have pupils explain some examples orally.

Divide these numbers. Check your work:

3.	$ 3.12 6)$18.72	$ 4.15R3¢ 6)$24.93	$ 6.18R4¢ 6)$37.12	$ 5.24 6)$31.44
4.	$ 8.46R1¢ 5)$42.31	$ 5.65 4)$22.60	$ 2.35 6)$14.10	$ 9.98 3)$29.94
5.	$ 2.73R3¢ 6)$16.41	$ 5.79 2)$11.58	$ 4.35R5¢ 6)$26.15	$ 2.81 6)$16.86
6.	$ 7.29 3)$21.87	$ 8.67 6)$52.02	$ 7.14 6)$42.84	$ 8.57 5)$42.85

More Practice. See ㉒ on page 320. Use to reinforce skill.

Discuss ex. 1 carefully, stressing reasons for placement of quotient figures, and exchange of dollars for dimes, and so on. Emphasize that decimal point in quotient appears directly above that in dividend. Stress value of remainder.

Provide review and practice in all four processes.

Keeping in Practice

Copy in columns, add, and check:

1. 8, 7, 9, 3 27   3, 8, 6, 7 24   7, 9, 0, 6 22
2. 5, 4, 9, 8 26   7, 9, 6, 5 27   8, 6, 5, 5 24
3. 6, 6, 9, 7 28   7, 8, 9, 2 26   9, 1, 8, 5 23
4. 4, 7, 9, 9 29   8, 8, 7, 7 30   4, 6, 5, 8 23
5. 9, 2, 4, 5 20   6, 9, 7, 8 30   8, 5, 9, 2 24

Subtract and check:

6.	855	742	885	9768	4452	2843
	493	389	267	5145	1645	1297
	362	353	618	4623	2807	1546
7.	600	521	500	3676	2700	4879
	548	162	265	2279	2236	3982
	52	359	235	1397	464	897

Divide each number by 6:

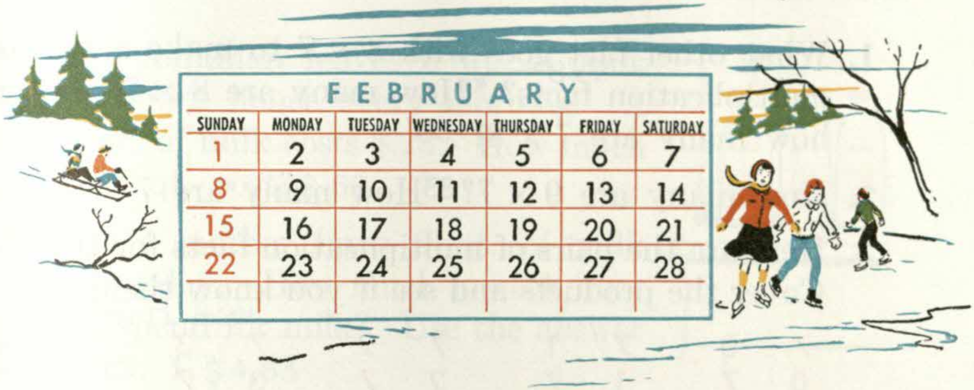
8. 954 159   858 143   792 132   588 98   342 57   1086 181
9. 687 114R3   205 34R1   400 66R4   683 113R5   921 153R3   2154 359
10. 144 24   772 128R4   522 87   824 137R2   456 76   3788 631R2
11. 752 125R2   510 85   679 113R1   504 84   354 59   4368 728
12. 846 141   702 117   967 161R1   475 79R1   541 90R1   1392 232

Multiply and check the work:

13.	672	584	266	169	$6.08	$6.56
	6	6	5	4	3	2
	4032	3504	1330	676	$18.24	$13.12
14.	146	462	365	139	$1.60	$9.57
	6	9	8	6	7	6
	876	4158	2920	834	$11.20	$57.42

Urge pupils to do some examples without pencil and paper. Better pupils should do ex. 1-5 and 8-12 mentally. Make a comparison to point out ease of mental arithmetic.

The 7's in Multiplication



FEBRUARY						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

1. Name the days of the week. How many days are there in 1 week? 7 If you do not know, look at the calendar above. How many days are there in 2 weeks? 14 How many are two 7's? 14 2 × 7? 14

2. How many days are there in 3 weeks? 21 How many are three 7's? 21 How many are 3 × 7? 21

3. How many days are there in 4 weeks? 28 How many are four 7's? 28 How many are 4 × 7? 28

4. Four 7's are 28. Then five 7's are 7 more than 28, or . . . 35 Five 7's are . . . 35 How many are 5 × 7? 35

5. Five 7's are 35. Six 7's are 7 more than 35, or . . . 42 Six 7's are . . . 42 How many are 6 × 7? 42

6. Since six 7's are 42, seven 7's are 7 more than 42, or . . . 49 Seven 7's are . . . 49 How many are 7 × 7? 49

7. In the same way tell how many eight 7's are. 56 Then tell how many nine 7's are. 63

8. How many are 8 × 7? 56 Then how many are 9 × 7? 63

9. 3 × 7 = 21, so 9 × 7 = . . . 63 Nine 7's = . . . 63

10. 4 × 7 = 28, so 8 × 7 = . . . 56 Eight 7's = . . . 56

Only new facts are 7 × 7 = 49, 8 × 7 = 56, 9 × 7 = 63. Encourage pupils to discover facts from known ones by additive method, as in ex. 4–6 (in each case, adding 7). Use multiplication tables to stress this.

Review multiplication facts of 7's and teach reverses.

The 7's in Multiplication

1. What other fact goes with 8 × 7 to make a pair of multiplication facts? 7x8 How many are 8 × 7? 56 Then how many are 7 × 8? 56

2. How many are 9 × 7? 63 How many are 7 × 9? 63

3. Here are the pairs of multiplication facts for the 7's. Cover the products and see if you know them:

Make flash cards.

$$\begin{array}{r}7\\0\\\hline 0\end{array}\;\begin{array}{r}0\\7\\\hline 0\end{array}\quad\begin{array}{r}7\\1\\\hline 7\end{array}\;\begin{array}{r}1\\7\\\hline 7\end{array}\quad\begin{array}{r}7\\2\\\hline 14\end{array}\;\begin{array}{r}2\\7\\\hline 14\end{array}\quad\begin{array}{r}7\\3\\\hline 21\end{array}\;\begin{array}{r}3\\7\\\hline 21\end{array}\quad\begin{array}{r}7\\4\\\hline 28\end{array}\;\begin{array}{r}4\\7\\\hline 28\end{array}$$

$$\begin{array}{r}7\\5\\\hline 35\end{array}\;\begin{array}{r}5\\7\\\hline 35\end{array}\quad\begin{array}{r}7\\6\\\hline 42\end{array}\;\begin{array}{r}6\\7\\\hline 42\end{array}\quad\begin{array}{r}7\\8\\\hline 56\end{array}\;\begin{array}{r}8\\7\\\hline 56\end{array}\quad\begin{array}{r}7\\9\\\hline 63\end{array}\;\begin{array}{r}9\\7\\\hline 63\end{array}\quad\begin{array}{r}7\\7\\\hline 49\end{array}$$

4. Write the 19 facts in ex. 3 with the sign ×, like this: 0 × 7 = 0, 7 × 0 = 0, 1 × 7 = 7, and so on.

5. Bill spends 8¢ to ride on the bus. How much does he spend to ride 7 times? 56¢

What numbers should be put in the spaces?

6. 8 × 7 = ... 56 7 × 6 = ... 42 7 × 9 = ... 63

7. 5 × 7 = ... 35 7 × 8 = ... 56 7 × 4 = ... 28

8. 7 × 7 = ... 49 9 × 7 = ... 63 6 × 7 = ... 42

9. Multiply the numbers in ex. 6–8 again and add 4 to each answer. Do all the work mentally. Ex.6:60,46,67; ex.7:39,60,32; ex.8:53,67,46

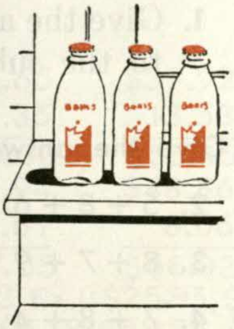
Give the answers:

10.
$$\begin{array}{r}7\\4\\\hline 28\end{array}\quad\begin{array}{r}5\\7\\\hline 35\end{array}\quad\begin{array}{r}7\\0\\\hline 0\end{array}\quad\begin{array}{r}7\\7\\\hline 49\end{array}\quad\begin{array}{r}9\\7\\\hline 63\end{array}\quad\begin{array}{r}7\\2\\\hline 14\end{array}\quad\begin{array}{r}0\\7\\\hline 0\end{array}\quad\begin{array}{r}1\\7\\\hline 7\end{array}\quad\begin{array}{r}3\\7\\\hline 21\end{array}$$

Use commutative principle to discover new facts (ex. 1–2). Have pupils put new 7's facts on tables. Review all facts taught thus far and plan for drill based on results.

Use 7's in multiplying 2-figure and 3-figure numbers.

The Cost of Milk



1. The milkman leaves 3 qt. of milk at Jane's house every morning. A quart of milk costs \$.23. How much do 3 qt. cost? \$.69

2. Jane's mother buys 3 qt. of milk every day. How much a week does she spend for milk? Use the answer to ex. 1. \$4.83

3. How much do 4 qt. of milk cost at \$.23 a quart? \$.92 What does milk for a week cost at \$.92 a day? \$6.44

4. A gallon of milk costs \$.75. How much do 7 gal. cost? \$5.25 How much can be saved each week by buying 1 gal. a day instead of 4 qt. in bottles? \$1.19 See ex. 3.

Multiply. Check your work by going over it:

5.	76 2 152	356 7 2492	293 7 2051	714 7 4998	\$2.80 7 \$19.60	\$1.95 7 \$13.65
6.	47 7 329	268 7 1876	409 7 2863	196 7 1372	\$3.74 7 \$26.18	\$1.47 9 \$13.23
7.	63 7 441	576 7 4032	398 6 2388	432 7 3024	\$8.70 7 \$60.90	\$3.72 5 \$18.60

Multiply each number by 7 and check:

8. 68 476 277 1939 730 5110 189 1323 829 5803 717 5019

9. 37 259 457 3199 570 3990 606 4242 275 1925 139 973

10. 84 588 125 875 405 2835 168 1176 620 4340 403 2821

Have pupils explain work orally. Note if carrying process or basic facts cause difficulty. Conduct drills similar to ex. 9, page 148. Reteach if necessary, stressing addition of carried number after multiplication.

Oral Review

1. Give the answers to the addition facts on page 7 and to the subtraction facts on page 13. (See answers for these pages)

Give the answers:

2. 5 + 8 + 6 19　　6 + 9 + 7 22　　28 − 23 5　　34 − 11 23

3. 8 + 7 + 9 24　　7 + 3 + 8 18　　59 − 37 22　　68 − 54 14

4. 7 + 8 + 4 19　　9 + 9 + 9 27　　18 − 14 4　　20 − 13 7

5. 9 + 6 + 5 20　　7 + 9 + 6 22　　40 − 25 15　　76 − 36 40

Add 5 to each number;(1) add 8;(2) add 4;(3) add 9;(4) add 7:(5)

(1),(2)	37,40	83,86	50,53	102,105	68,71	89,92	64,67	21,24
(3) **6.**	32 36	78 82	45 49	97 101	63 67	84 88	59 63	16 20
(4),(5)	41,39	87,85	54,52	106,104	72,70	93,91	68,66	25,23

Subtract 10 from each number;(1) subtract 5;(2) subtract 3:(3)

(1)	86	70	24	11	52	33	68	4
(2) **7.**	96 91	80 75	34 29	21 16	62 57	43 38	78 73	14 9
(3)	93	77	31	18	59	40	75	11

Find the sums:

8.	30	28	43	81	36	18	54	27
	60	40	42	12	6	5	9	8
	90	68	85	93	42	23	63	35
9.	53	43	24	23	31	26	18	35
	41	34	54	17	29	44	12	35
	94	77	78	40	60	70	30	70

Find the remainders.(1) Then find the sums:(2)

10.	65	86	96	58	36	94	55	60
	61	83	90	51	21	70	32	20
(1),(2)	4,126	3,169	6,186	7,109	15,57	24,164	23,87	40,80
11.	62	41	92	76	34	21	30	45
	7	3	6	6	6	17	24	36
	55,69	38,44	86,98	70,82	28,40	4,38	6,54	9,81

Have pupils do all exercises mentally. Give further practice in adding by endings by having pupils count by 2's, 3's, 4's, 5's, and so on, starting at different points.

Add these numbers and check:

1.	$47.48	$42.67	$57.05	$27.65	$39.92
	21.55	42.26	12.59	11.35	13.53
	$69.03	$84.93	$69.64	$39.00	$53.45
2.	$43.39	$82.68	$36.90	$72.94	$48.86
	14.67	2.47	30.12	14.61	8.06
	$58.06	$85.15	$67.02	$87.55	$56.92

3. Subtract the numbers in ex. 1 and 2. Ex.1: $25.93, $.41, $44.46, $16.30, $26.39; ex.2: $28.72, $80.21, $6.78, $58.33, $40.80

Copy in columns, add, and check:

4. 7, 1, 8, 4, 8 28 4, 2, 5, 5, 8 24 3, 3, 4, 6, 9 25

5. 1, 9, 6, 7, 5 28 6, 3, 8, 4, 2 23 7, 0, 5, 8, 4 24

6. 2, 7, 6, 9, 9 33 8, 2, 7, 5, 4 26 9, 8, 4, 2, 7 30

7. Mother spent $18.75 for a coat for Bill and $19.39 for a coat for Ann. How much did both coats cost? $38.14 What was the difference in their prices? $.64

Subtract the smaller number from the larger:

8. 500; 482 18 684; 256 428 235; 508 273 375; 850 475

9. 137; 526 389 681; 708 27 469; 354 115 957; 698 259

10. Find the difference between 9255 and 4795. 4460

11. How much more than $14.95 is $25.00? $10.05

Subtract and check:

12.	185	174	808	6955	9700	8629
	92	95	213	1761	1322	3875
	93	79	595	5194	8378	4754
13.	600	942	800	8681	6725	1057
	336	298	767	1868	4567	547
	264	644	33	6813	2158	510

Some pupils may need further review in regrouping and carrying concepts. Use pocket chart to re-explain. Let other pupils work at arithmetic corner.

Teach even division facts of 7's (pages 152-153).

Some New Division Facts

1. Here are 21 children. They will ride to the zoo in large cars. 7 children can ride in each car. How many cars are needed for 21 children? 3 How many 7's make 21? 3 How many are 21 ÷ 7? 3

2. Draw 28 dots on paper. Draw lines to divide the dots into groups with 7 dots in each group. How many 7's make 28? 4 How many are 28 ÷ 7? 4

3. Draw 35 dots. Then draw lines to show that 35 ÷ 7 = 5.

4. The multiplication facts for 7 will help you to learn the division facts for 7. Think, "6 × 7 = 42, so there are six 7's in 42." What does 42 ÷ 7 equal? 6

5. How many 7's make 49? 7 How many are 49 ÷ 7? 7

6. How many are eight 7's? 56 Then how many are 56 ÷ 7? 8 How many are $7\overline{)56}$? 8

7. Nine 7's are how many? 63 How many are 63 ÷ 7? 9

Tell what numbers should be put in the spaces:

8. .7. × 7 = 49, so there are .7. 7's in 49.

9. .9. × 7 = 63, so there are .9. 7's in 63.

10. .6. × 7 = 42, so there are .6. 7's in 42.

11. .8. × 7 = 56, so there are .8. 7's in 56.

Follow development as written on page. Stress discovery of facts through known related multiplication facts. Let pupils, who need to, use objects or drawings to reinforce meanings of facts.

Dividing by 7

1. What division fact can you make from $4 \times 7 = 28$? 28 ÷ 7 = 4 from $1 \times 7 = 7$? 7 ÷ 7 = 1 from $6 \times 7 = 42$? 42 ÷ 7 = 6

2. What multiplication fact tells you the answer to $7\overline{)49}$? 7 x 7 = 49 to $7\overline{)63}$? 9 x 7 = 63 to $7\overline{)21}$? 3 x 7 = 21 to $7\overline{)56}$? 8 x 7 = 56 to $7\overline{)14}$? 2 x 7 = 14

3. How many weeks are there in 35 days? 5 in 63 days? 9 in 21 days? 3 in 14 days? 2

4. There are 42 days until Peter's birthday. How many weeks is this? 6

5. Learn these new division facts:

$$\begin{array}{r}0\\7\overline{)0}\end{array} \qquad \begin{array}{r}1\\7\overline{)7}\end{array} \qquad \begin{array}{r}2\\7\overline{)14}\end{array} \qquad \begin{array}{r}3\\7\overline{)21}\end{array} \qquad \begin{array}{r}4\\7\overline{)28}\end{array}$$

$$\begin{array}{r}5\\7\overline{)35}\end{array} \qquad \begin{array}{r}6\\7\overline{)42}\end{array} \qquad \begin{array}{r}7\\7\overline{)49}\end{array} \qquad \begin{array}{r}8\\7\overline{)56}\end{array} \qquad \begin{array}{r}9\\7\overline{)63}\end{array}$$

6. Write the division facts in ex. 5, using the sign ÷. For example, $63 \div 7 = 9$, $56 \div 7 = 8$, and so on.

7. At 7¢ each, how many cupcakes can I buy for 35¢? 5

8. How many 7-cent candy bars can I buy for 14¢? 2

Give the answers: Urge pupils to respond quickly.

9. 42 ÷ 7 = 6 63 ÷ 7 = 9 ..7. 7's = 49 ..5. 7's = 35

10. 56 ÷ 7 = 8 21 ÷ 7 = 3 ..9. 7's = 63 ..2. 7's = 14

11. 28 ÷ 7 = 4 49 ÷ 7 = 7 ..3. 7's = 21 ..8. 7's = 56

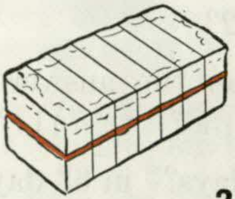
12. 35 ÷ 7 = 5 14 ÷ 7 = 2 ..6. 7's = 42 ..7. 7's = 49

13. 63 ÷ 7 = 9 7 ÷ 7 = 1 ..2. 7's = 14 ..4. 7's = 28

Have pupils prove facts in ex. 5 by referring to own multiplication tables and by subtraction. Ask pupils to tell you 2 facts whose product is 35, then whose dividend is 35. Use other multiples of 7.

Teach how to find $\frac{1}{7}$ of a number.

One Seventh



1. Here is a picture of a cake cut into 7 equal pieces. Each piece is **one seventh** of the whole cake. There are 7 sevenths in the whole cake. This shows that $\frac{7}{7} = 1$.

2. Three pieces of the cake are three sevenths of it. You write three sevenths like this: $\frac{3}{7}$. Show how to write four sevenths, $\frac{4}{7}$ five sevenths, $\frac{5}{7}$ two sevenths. $\frac{2}{7}$

3. Here are 14 pennies divided into seven equal groups. What part of 14 is each group? One seventh How many are $\frac{1}{7}$ of 14 pennies? 2 pennies How many are $\frac{1}{7}$ of 14? 2 How many are $14 \div 7$? 2

Emphasize.

To find $\frac{1}{7}$ of a number, divide it by 7.

4. Draw 21 dots on paper by putting them one at a time into 7 equal groups. How many dots are there in each group? 3 How many are $\frac{1}{7}$ of 21 dots? 3 How many are $\frac{1}{7}$ of 21? 3

5. How many are $\frac{1}{7}$ of 28¢? 4¢ $\frac{1}{7}$ of 42¢? 6¢ $\frac{1}{7}$ of 7¢? 1¢

Give the answers:

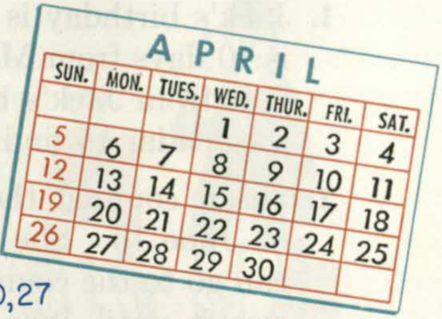
6. $\frac{1}{7}$ of 35 5 $\frac{1}{7}$ of 21 3 $\frac{1}{7}$ of 42 6 $\frac{1}{7}$ of 28 4

7. $\frac{1}{7}$ of 49 7 $\frac{1}{7}$ of 14 2 $\frac{1}{7}$ of 63 9 $\frac{1}{7}$ of 56 8

Review how to find $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$ of a number. Let pupils make generalization boxed above; use objects to reinforce understanding. In ex. 2, have pupils illustrate sevenths and tell what top numbers mean.

Extend reading of calendar to include abbreviations for days and measurement of elapsed time.

Studying the Calendar



APRIL

SUN.	MON.	TUES.	WED.	THUR.	FRI.	SAT.
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

1. Here are the abbreviations for the days of the week. Learn them: Sun., Mon., Tues., Wed., Thur., Fri., Sat.

2. Look at the numbers under Mon. What are the dates of the Mondays in April? 6, 13, 20, 27

3. Suppose you know that the date of the first Wednesday in April is April 1. How can you give the dates of the other Wednesdays in April without using a calendar? Add 7 four times.

4. Suppose you know that the first Tuesday in September is September 2. Give the dates of the other Tuesdays in September without looking at a calendar. 9, 16, 23, 30 How many Tuesdays are there? 5

5. Count by 7's from 1 to 29; 1, 8, 15, 22, 29 from 3 to 31. 3, 10, 17, 24, 31

6. How many days are there in April? 30 How many weeks and days are there in April? 4 weeks, 2 days How many 7's are there in 30? 4 What does $7\overline{)30}$ equal? 4 R2

7. How many days are there in July? 31 How many weeks are there in July? 4 Are any days left over? Yes, 3

8. Does any month of the year have just 4 weeks? Yes, February, except in leap year.

9. Does any month of the year have 5 weeks? No

10. What is the date 1 week from May 11? May 18

11. What is the date 2 weeks from August 10? August 24

12. What is the date 3 weeks from June 1? June 22

13. What is the date 4 weeks from October 1? October 29

Review number of days in week and how to find, from known day, date of a day a week later. Have better students investigate why there are 365 days in year, and reason for leap year.

Teach uneven division facts of 7's.

How Many Weeks?

1. Jack's birthday is on May 4. His father's birthday is 40 days from May 4. How many weeks and days is it from Jack's birthday to his father's? 5 weeks, 5 days Look at a calendar to find the date of his father's birthday. June 13

2. Susan counted the days until school would be out on June 16. She said, "There are 58 days until we can go to the country." How many weeks and days was it until June 16? 8 weeks, 2 days

3. There are 68 days from February 1 until Easter. How many weeks and days is that? 9 weeks, 5 days

4. There are 35 days from May 30 until July 4. How many weeks and days is that? 5 weeks, no days

5. How many weeks and days are there in March? 4 week, 3 days

Divide. Find the quotients and remainders: Use long form.

6. $\overset{9R4}{7\overline{)67}}$ $\overset{8R3}{7\overline{)59}}$ $\overset{3R3}{7\overline{)24}}$ $\overset{2R1}{7\overline{)15}}$ $\overset{5R3}{7\overline{)38}}$ $\overset{6R2}{7\overline{)44}}$ $\overset{0R5}{7\overline{)5}}$

7. $\overset{3R5}{7\overline{)26}}$ $\overset{6R5}{7\overline{)47}}$ $\overset{9R3}{7\overline{)66}}$ $\overset{5R2}{7\overline{)37}}$ $\overset{6R3}{7\overline{)45}}$ $\overset{2R5}{7\overline{)19}}$ $\overset{1R2}{7\overline{)9}}$

8. $\overset{7R5}{7\overline{)54}}$ $\overset{4R1}{7\overline{)29}}$ $\overset{2R4}{7\overline{)18}}$ $\overset{9R5}{7\overline{)68}}$ $\overset{5R1}{7\overline{)36}}$ $\overset{6R6}{7\overline{)48}}$ $\overset{0R4}{7\overline{)4}}$

9. $\overset{9R6}{7\overline{)69}}$ $\overset{3R2}{7\overline{)23}}$ $\overset{4R2}{7\overline{)30}}$ $\overset{8R1}{7\overline{)57}}$ $\overset{1R6}{7\overline{)13}}$ $\overset{7R6}{7\overline{)55}}$ $\overset{0R2}{7\overline{)2}}$

10. $\overset{8R4}{7\overline{)60}}$ $\overset{3R1}{7\overline{)22}}$ $\overset{7R2}{7\overline{)51}}$ $\overset{2R3}{7\overline{)17}}$ $\overset{7R4}{7\overline{)53}}$ $\overset{6R1}{7\overline{)43}}$ $\overset{0R1}{7\overline{)1}}$

11. $\overset{4R5}{7\overline{)33}}$ $\overset{8R6}{7\overline{)62}}$ $\overset{3R6}{7\overline{)27}}$ $\overset{8R5}{7\overline{)61}}$ $\overset{4R4}{7\overline{)32}}$ $\overset{7R3}{7\overline{)52}}$ $\overset{1R1}{7\overline{)8}}$

12. $\overset{1R3}{7\overline{)10}}$ $\overset{4R6}{7\overline{)34}}$ $\overset{5R6}{7\overline{)41}}$ $\overset{4R3}{7\overline{)31}}$ $\overset{2R6}{7\overline{)20}}$ $\overset{1R5}{7\overline{)12}}$ $\overset{0R6}{7\overline{)6}}$

Do ex. 1-5 orally with pupils; ask them how to find answers without a calendar. Let different pupils explain work in ex. 6-12 at board. Remind them of helping numbers (next smaller number that can be divided by 7 evenly).

Extend division of 3-figure and 4-figure numbers by 7.

Problems and Practice

1. Last summer there was no school from June 16 until September 6. Jim figured the days from June 16 until September 6. He said, "There are 14 days left in June, ..31.. days in July, ..31.. days in August, 6 days in September." How many days was that all together? 82

2. How many weeks and days was there no school for Jim last summer? 11 weeks, 5 days

3. Jim went to camp for 7 weeks. It cost $154 all together. How much did it cost for 1 week at camp? $22

Divide these numbers by 7. Check by multiplying:

4. 161 23 960 137R1 183 26R1 500 71R3 831 118R5 2555 365

5. 200 28R4 859 122R5 250 35R5 658 94 477 68R1 4291 613

6. 784 112 620 88R4 511 73 918 131R1 792 113R1 3000 428R4

7. 616 88 427 61 336 48 128 18R2 378 54 5173 739

8. Mr. Hill paid $52.50 to stay at Blue Lake for a week. How much was that for 1 day? $7.50

Stress adding remainder "after" multiplication.

Divide. Check by multiplying:

9. $\begin{array}{r}59R4\\7\overline{)417}\end{array}$ $\begin{array}{r}133\\7\overline{)931}\end{array}$ $\begin{array}{r}24\\7\overline{)168}\end{array}$ $\begin{array}{r}285R5\\7\overline{)2000}\end{array}$ $\begin{array}{r}976R1\\7\overline{)6833}\end{array}$

10. $\begin{array}{r}37R1\\7\overline{)260}\end{array}$ $\begin{array}{r}81R2\\7\overline{)569}\end{array}$ $\begin{array}{r}112R4\\7\overline{)788}\end{array}$ $\begin{array}{r}279R1\\7\overline{)1954}\end{array}$ $\begin{array}{r}642R6\\7\overline{)4500}\end{array}$

11. $\begin{array}{r}56\\7\overline{)392}\end{array}$ $\begin{array}{r}86R3\\7\overline{)605}\end{array}$ $\begin{array}{r}114R2\\7\overline{)800}\end{array}$ $\begin{array}{r}545R3\\7\overline{)3818}\end{array}$ $\begin{array}{r}229R4\\7\overline{)1607}\end{array}$

Review the 5 steps in division, even facts of 7's, and place value. Be sure pupils understand placement of quotient figure. Group pupils for special work on place value and/or process steps, based on work in ex. 4-11. Use flash cards for drill on facts.

Review fractions, adding by endings, change making.

More Practice

1. How many 7-cent bars of soap can I buy for 50¢? 7

2. Find the cost of ½ pound of nuts at 90¢ a pound. 45¢

3. Bill sold 7 doz. eggs last week. How many eggs was that all together? 84

4. There were 144 sheets of drawing paper in a new box of paper. Now only 9 sheets of it are left. How many sheets are gone? 135

5. At the store on the corner Jane spent 18¢, 8¢, 25¢, 4¢, and 16¢. How much in all did Jane spend? 71¢

6. Last year at this time Andy weighed 56 pounds. Now he weighs 64 pounds. How many pounds has Andy gained? 8

7. Which piece would be larger,

(a) $\frac{1}{3}$ of a candy bar or $\frac{2}{3}$ of a candy bar? $\frac{2}{3}$
(b) $\frac{1}{2}$ of a candy bar or $\frac{1}{3}$ of a candy bar? $\frac{1}{2}$
(c) $\frac{1}{7}$ of a candy bar or $\frac{1}{4}$ of a candy bar? $\frac{1}{4}$
(d) $\frac{3}{4}$ of a candy bar or $\frac{1}{4}$ of a candy bar? $\frac{3}{4}$

Add 3 to each number; (1) add 6; (2) add 4; (3) add 5: (4)

(1),(2) 30,33 42,45 55,58 80,83 21,24 49,52 68,71 17,20
(3),(4) **8.** 27 31,32 39 43,44 52 56,57 77 81,82 18 22,23 46 50,51 65 69,70 14 18,19
95,98 61,64 69,72 26,29 38,41 82,85 84,87 43,46
9. 92 96,97 58 62,63 66 70,71 23 27,28 35 39,40 79 83,84 81 85,86 40 44,45

Subtract 10 from each number; (1) subtract 20; (2) subtract 5: (3)

(1),(2) 25,15 46,36 29,19 77,67 34,24 50,40 63,53 18,8 80,70
(3) **10.** 35 30 56 51 39 34 87 82 44 39 60 55 73 68 28 23 90 85
71,61 60,50 53,43 85,75 22,12 68,58 54,44 20,10 41,31
11. 81 76 70 65 63 58 95 90 32 27 78 73 64 59 30 25 51 46

Count the change from $1.00 for things that cost:

47,50,$1.00 25,50,$1.00 38,39,40,50,$1.00 13,15,25,$1.00
12. 47¢ ↘ 19¢ ↗ 25¢ ↘ 60¢ ↗ 38¢ ↘ 26¢ ↖ 13¢ ↘
19,20,25,50,$1.00 60,65,75,$1.00 26,30,40,50,$1.00

Have pupils do most of these orally. In ex. 7, check pupils' understanding of meaning of top and bottom numbers. Compare other fractions in like manner. Urge pupils to respond quickly in ex. 8–11.

See G-56 for correlation of examples with aims.

Chapter Review

Find the answers:

1. $\frac{1}{7}$ of 42 6 $\frac{1}{6}$ of 78 13 $\frac{1}{6}$ of 252 42 $\frac{1}{7}$ of 588 84

2. $\frac{1}{6}$ of 66 11 $\frac{1}{6}$ of 90 15 $\frac{1}{7}$ of 217 31 $\frac{1}{7}$ of 665 95

3. $\frac{1}{6}$ of 48 8 $\frac{1}{7}$ of 63 9 $\frac{1}{7}$ of 357 51 $\frac{1}{6}$ of 174 29

4. $\frac{1}{7}$ of 35 5 $\frac{1}{7}$ of 84 12 $\frac{1}{6}$ of 522 87 $\frac{1}{6}$ of 354 59

5. $\frac{1}{6}$ of 54 9 $\frac{1}{6}$ of 96 16 $\frac{1}{7}$ of 504 72 $\frac{1}{7}$ of 259 37

Multiply and check:

6.	65	56	427	374	$6.17	$6.77
	7	6	6	7	9	8
	455	336	2562	2618	$55.53	$54.16

7. At 6¢ each, find the cost of 8 post cards. 48¢

8. How many 7's are there in 50? 7 in 32? 4 in 63? 9

9. How many weeks and days are there in July? 4 weeks, 3 days

10. How many weeks and days are there in 66 days? 9 weeks, 3 days

11. Ann paid $.98 for 7 bus tickets. Find the cost of 1 ticket. $.14

12. Tom paid $1.38 for 6 cans of dog food. Find the cost of 1 can of food. $.23

13. Andy sold 45 newspapers at $.07 each. How much money did he get for these papers? $3.15

Divide and check:

14. $\begin{array}{r}65\\6\overline{)390}\end{array}$ $\begin{array}{r}83R2\\6\overline{)500}\end{array}$ $\begin{array}{r}225\\6\overline{)1350}\end{array}$ $\begin{array}{r}\$\,9.74R1¢\\6\overline{)\$58.45}\end{array}$ $\begin{array}{r}\$\,4.13\\6\overline{)\$24.78}\end{array}$

15. $\begin{array}{r}82\\7\overline{)574}\end{array}$ $\begin{array}{r}113\\7\overline{)791}\end{array}$ $\begin{array}{r}271\\7\overline{)1897}\end{array}$ $\begin{array}{r}\$\,3.54\\7\overline{)\$24.78}\end{array}$ $\begin{array}{r}\$\,9.38\\7\overline{)\$65.66}\end{array}$

Use review as preparation for diagnostic test (pages 161-162). Note errors or hesitancy on progress cards. Be sure pupils understand that $\frac{1}{7}$ or $\frac{1}{6}$ of a number means to divide by 7 or 6. Plan for reteaching.

A Problem Test

This is the fourth Problem Test. Count 10 for each problem you have right.

1. Father bought 7 circus tickets. They cost $2.65 apiece. How much did all the tickets cost? $18.55

2. Father gave the man $20.00 to pay for the tickets. How much change did Father get?(1) Tell what coins and bills the man might have given Father.(2) (1) $1.45; (2) two dimes, 1 quarter, a dollar bill

3. There are 115 days from the first of September until Christmas. How many weeks and days is that? 16 weeks, 3 days

4. For lunch at school Ann spent 12¢, 5¢, 7¢, 10¢, and 3¢. How much in all did Ann spend for lunch? 37¢

5. On a trip to the zoo Mary spent all but 15¢ of a dollar bill. How much did Mary spend? $.85

6. On the same trip Ben spent 25¢, 14¢, 8¢, 35¢, and 7¢. How much did Ben spend on that trip? 89¢

7. Peggy is selling seeds. She has 6 boxes that each hold 25 packages of seeds. How many packages of seeds has Peggy to sell? 150

8. At the post office Bill bought 4-cent stamps. He got a sheet of stamps that had 7 rows with 10 stamps in a row. How many stamps did he get in all? 70

9. There are 6 rooms in the Parkside School. Each room is trying to earn $\frac{1}{6}$ of the $16.50 needed for the Red Cross. How much money should each room earn? $2.75

10. Mother will buy a coat for Jack. Jack looked at one coat that cost $25.00 and at another that cost $21.75. What was the difference in the prices? $3.25

Have pupils work independently. Then go over problems orally, letting different pupils tell process used and reason for choice. Provide special help for pupils who have difficulty understanding thought patterns.

Present diagnostic test of addition, subtraction, multiplication, and division (page 162).

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Pages for that row.

Add and check:

							Practice Pages
1.	6	3	4	38	55	34	94, 146
	4	8	7	15	16	12	
	8	7	5	42	45	25	
	7	9	6	26	81	39	
	25	27	22	121	197	110	

2.	249	167	658	1363	4178	39, 63
	616	608	531	2123	2292	
	147	364	494	4512	3447	
	1012	1139	1683	7998	9917	

Subtract and check:

3.	425	718	373	600	836	39, 94
	179	638	239	345	357	
	246	80	134	255	479	

4.	2746	6860	5949	4695	94, 146
	1442	4547	5453	3298	
	1304	2313	496	1397	

Multiply and check:

5.	178	495	289	$3.46	$1.53	92, 93
	4	2	3	5	7	
	712	990	867	$17.30	$10.71	

6.	123	740	615	$2.98	$1.06	126
	6	6	6	6	8	
	738	4440	3690	$17.88	$8.48	

7.	436	245	167	$3.80	$2.17	149
	7	7	9	7	7	
	3052	1715	1503	$26.60	$15.19	

Plan reteaching and remedial work as needed. Use practice pages related to pupils' difficulties. Emphasize meanings in reteaching.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Pages for that row.

Divide. Check the work by multiplying:

						Practice Pages
1.	$\overset{6\text{R}1}{2\overline{)13}}$	$\overset{6\text{R}2}{4\overline{)26}}$	$\overset{6\text{R}1}{3\overline{)19}}$	$\overset{9\text{R}3}{4\overline{)39}}$	$\overset{7\text{R}2}{3\overline{)23}}$	74
2.	$\overset{9\text{R}2}{5\overline{)47}}$	$\overset{3\text{R}3}{5\overline{)18}}$	$\overset{5\text{R}4}{5\overline{)29}}$	$\overset{8\text{R}1}{5\overline{)41}}$	$\overset{4\text{R}4}{5\overline{)24}}$	103, 104
3.	$\overset{8\text{R}5}{6\overline{)53}}$	$\overset{3\text{R}2}{6\overline{)20}}$	$\overset{7\text{R}3}{6\overline{)45}}$	$\overset{6\text{R}1}{6\overline{)37}}$	$\overset{4\text{R}4}{6\overline{)28}}$	136
4.	$\overset{7\text{R}1}{7\overline{)50}}$	$\overset{5\text{R}4}{7\overline{)39}}$	$\overset{9\text{R}2}{7\overline{)65}}$	$\overset{2\text{R}2}{7\overline{)16}}$	$\overset{3\text{R}4}{7\overline{)25}}$	156
5.	$\overset{78}{3\overline{)234}}$	$\overset{87\text{R}1}{2\overline{)175}}$	$\overset{64}{4\overline{)256}}$	$\overset{95}{3\overline{)285}}$		84
6.	$\overset{58}{5\overline{)290}}$	$\overset{72\text{R}4}{5\overline{)364}}$	$\overset{96\text{R}3}{5\overline{)483}}$	$\overset{34}{5\overline{)170}}$		105
7.	$\overset{38\text{R}1}{6\overline{)229}}$	$\overset{95}{6\overline{)570}}$	$\overset{29\text{R}5}{6\overline{)179}}$	$\overset{64}{6\overline{)384}}$		137
8.	$\overset{145}{5\overline{)725}}$	$\overset{139\text{R}3}{6\overline{)837}}$	$\overset{277}{3\overline{)831}}$	$\overset{239}{4\overline{)956}}$		140
9.	$\overset{\$4.69}{2\overline{)\$9.38}}$	$\overset{\$1.61}{5\overline{)\$8.05}}$	$\overset{\$1.87\text{R}2¢}{4\overline{)\$7.50}}$	$\overset{\$1.62}{6\overline{)\$9.72}}$		145
10.	$\overset{56\text{R}3}{7\overline{)395}}$	$\overset{85\text{R}5}{7\overline{)600}}$	$\overset{429}{7\overline{)3003}}$	$\overset{734}{7\overline{)5138}}$		157

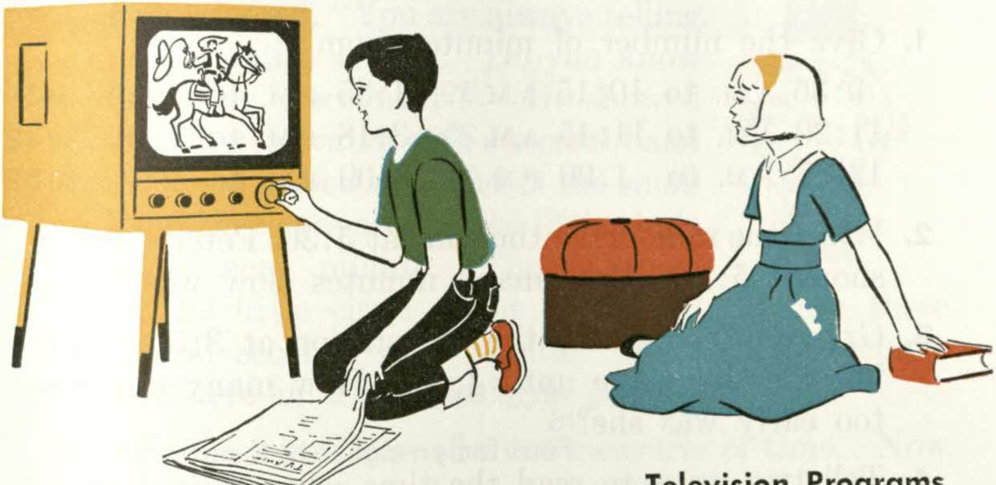
Find the answers:

11.	$\frac{1}{4}$ of 172 43	$\frac{1}{4}$ of 300 75	$\frac{1}{4}$ of 276 69	84
12.	$\frac{1}{5}$ of 280 56	$\frac{1}{5}$ of 185 37	$\frac{1}{5}$ of 245 49	118
13.	$\frac{1}{6}$ of 498 83	$\frac{1}{6}$ of 342 57	$\frac{1}{6}$ of 384 64	146
14.	$\frac{1}{7}$ of 203 29	$\frac{1}{7}$ of 581 83	$\frac{1}{7}$ of 532 76	159

See suggestions for page 161. In remedial work, help pupils to analyze errors. Be sure pupils are acquiring good mastery of the four fundamental operations.

Reteach reading of clock and correlate with radio and television schedules. See G-57 for specific aims of Chapter 5.

Chapter 5



Television Programs

1. At 5:05 Jack looked in the newspaper to see what was on television. Here are some programs:

5:15	The Magic Man	6:15	Spaceman Dick
5:30	Fun Time	6:30	News
6:00	News	6:35	Story Time
6:05	Cowboy Jim	7:00	Nature Trails

How long did Jack have to wait for "The Magic Man" to begin? 10 minutes How long did that program last? 15 minutes

2. Betty wanted to see "Fun Time." How many minutes was that program on television? 30 Betty had to leave at 5:50. How many minutes of the program did she miss? 10

3. Tell how many minutes these programs are on: "Cowboy Jim," 10 "Spaceman Dick," 15 "Story Time." 25

4. Bring to school a television program from the newspaper. Tell how to use the program.

Use a clock face or clock dial for quick review of telling and writing time. Have different pupils read times shown in ex. 1. Then let pupils do ex. 2-3, using clock face to check accuracy of answers.

Extend clock reading to 1-minute intervals, using timetables.
Review meanings of A.M. and P.M.

More about Time

Look at a clock to answer these questions:

1. Give the number of minutes from

9:36 A.M. to 10:15 A.M. 39 1:35 P.M. to 2:06 P.M. 31
11:20 A.M. to 11:45 A.M. 25 3:18 P.M. to 3:30 P.M. 12
12:07 P.M. to 1:00 P.M. 53 6:09 P.M. to 7:01 P.M. 52

2. When the radio gave the time at 5:30, Peter's watch showed 5:17. How many minutes slow was it? 13

3. Grandmother got to the bus station at 3:50. The bus did not leave until 4:06. How many minutes too early was she? 16

4. Tell two ways to read the time when it is 4:48. Four forty-eight; 12 minutes to 5

5. A bus was supposed to leave the station at 2:56 P.M. but it was 15 min. late in starting. At what time did the bus leave? 3:11 P.M.

6. About how long does it take you to go to school? Tomorrow when you leave home look at the time. Then look at the time when you get in school. How many minutes did it take you to go to school?

7. How many hours are there between 6 A.M. and 6 P.M.? 12 between 6 P.M. and 6 A.M. the next day? 12 How many hours are there between 6 A.M. one day and 6 A.M. the next day? 24

8. How many hours are there between midnight and 7 A.M.? 7 between 10 A.M. and noon? 2

9. Jack went to the movies at 2:30 P.M. He came out at 4:50 P.M. How many hours and minutes had he been at the movies? 2 hr. 20 min.

Do work orally with pupils, letting different ones check answers on clock face. Have pupils bring in bus and train timetables to use to make up own problems about trips for class to solve.

Hours, Minutes, Seconds

1. "Wait a second, Bob," called Jim. Bob laughed, "You are always telling me to wait a second. Do you know how long a second is?" He showed Jim his new watch with a second hand on it. The second hand is the small hand that goes around the little circle once every minute. The numbers on the little circle go as far as 60 because there are 60 seconds in 1 minute. How many seconds are there in 2 minutes? 120 in $\frac{1}{2}$ minute? 30

2. On page 3 you learned some measures of time. Now you can add **seconds** to the table:

Put on class vocabulary chart.

60 seconds (sec.) = 1 minute (min.)
60 minutes (min.) = 1 hour (hr.)
24 hours (hr.) = 1 day (da.)

3. Ann can run across the playground in 18 sec. It takes Susan 22 sec. to run that far. How many seconds longer does it take Susan than Ann? 4

4. Bill can do an addition example in 15 sec. How many seconds will it take him to do 4 examples of this kind? 60 How many can he do in 1 min.? 4

5. The 9:30 bus did not come until 20 min. to 10. How many minutes late was the bus? 10

6. How many minutes are there in $\frac{1}{2}$ hr.? 30 in $\frac{1}{4}$ hr.? 15 How many seconds are there in $\frac{1}{4}$ min.? 15

Let pupils use own watches (with second hands) or stop watch (let them take turns) to calculate seconds in various class situations (walking across room, erasing blackboard). Also give practice in estimating seconds.

Addition and Subtraction

Copy in columns, add, and check:

1. 7, 5, 3, 9 24 6, 7, 5, 8 26 7, 5, 6, 0, 9 27
2. 5, 8, 6, 6 25 7, 5, 8, 8 28 4, 5, 9, 5, 3 26
3. 9, 4, 7, 8 28 9, 5, 4, 7 25 7, 8, 4, 7, 6 32
4. 7, 8, 7, 4 26 4, 7, 6, 5 22 3, 4, 5, 9, 5 26
5. 6, 5, 6, 3 20 6, 9, 9, 4 28 3, 8, 6, 4, 4 25

6. Find the sum of $6.87, $1.43, $8.28, $3.26. $19.84

7. Find the sum of $9.34, $3.19, $4.62, $2.19. $19.34

8. At the store Tom bought things that cost 62¢, 13¢, 56¢, 42¢, and 67¢. How much in all did Tom spend? $2.40

Subtract and check: Stress checking.

9.	768	591	129	4849	6493	5957
	304	473	42	1029	3425	1376
	464	118	87	3820	3068	4581
10.	837	840	400	3047	5942	9568
	265	189	254	1704	5178	5785
	572	651	146	1343	764	3783
11.	304	406	491	5600	7753	9865
	265	356	386	3248	7299	6950
	39	50	105	2352	454	2915

12. Take 463 from 752; 289 take 136 from 700. 564

13. Find the difference between 3862 and 1095. 2767

14. Ann gave the man $5.00 to pay a bill of $2.13. How much change did she get? $2.87

More Practice. See ㉓ on page 320.

Urge pupils to do ex. 1-5 mentally. Better pupils may do other examples mentally also. Note errors caused by basic facts, carrying, regrouping, or carelessness. Use "More Practice" pages for individual assistance.

Our Class Party

Present word problems arising from planning class party.

1. Our class will have a party on March 18. We began planning for the party 2 weeks earlier. On what date did we begin to plan the party? March 4

2. We expect 18 children and 24 mothers, fathers, and teachers, besides the 28 children in our class. How many people are expected at the party? 70

3. Some boys and girls are planning the games. There will be 5 prizes in all for those who win. Each prize cost $.75. How much did the prizes cost? $3.75

4. Other children are planning the food. They want to have 3 sandwiches apiece. How many sandwiches do they need for 70 people? 210

5. There will be 9 large cakes. If each cake is cut into 16 pieces, how many pieces will there be? 144 Can each one have 2 pieces of cake? 144 ÷ 70 = 2R4 ; yes

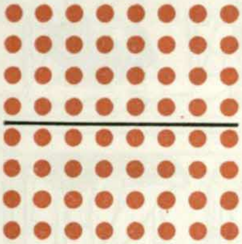
6. We will buy paper cups, plates, and napkins. There are 12 cups in 1 package and 12 plates in another. Will we need 5, or 6, or 7 packages of each? 6

7. A package holds 48 napkins. Do we need 1, 2, or 3 packages of napkins? 2

Have pupils list all arithmetic knowledge needed in planning a party. If planning own party, have pupils state and solve problems that arise. Urge them to state problem simply, collect accurate data, draw valid conclusions.

Teach last four multiplication facts.

4 New Multiplication Facts



1. Look at the dots at the left. There are 8 rows of dots with 8 dots in each row. How many are eight 8's? 64 How many are 8 × 8? 64

2. If you do not know the answer to ex. 1, here is the way to help yourself to find it. The line divides the dots into 2 equal groups. Each group has 4 rows of 8 dots. How many are four 8's? You know that 4 × 8 = 32. Then 8 × 8 = 2 × 32, or 64. If you do not know the answer to 8 × 8, find the answer to 4 × 8 and double it.

3. Here is a second way to help yourself. You know that 7 × 8 = 56. Then 8 × 8 is 8 more than 56, or ...64.

4. Here is the way to find the answer to 8 × 9. You know 4 × 9 = ...36. Then 8 × 9 = 2 × ...36, or ...72. How many are eight 9's? 72 How many are 8 × 9? 72

5. 9 × 9 is the last multiplication fact you have to learn. You know 8 × 9 = 72, so 9 × 9 is 9 more than 72, or ...81. How many are nine 9's? 81 How many are 9 × 9? 81

6. Learn these 4 new multiplication facts: Make flash cards.

$$\begin{array}{r}8\\\underline{8}\\64\end{array}\qquad\begin{array}{r}8\\\underline{9}\\72\end{array}\qquad\begin{array}{r}9\\\underline{8}\\72\end{array}\qquad\begin{array}{r}9\\\underline{9}\\81\end{array}$$

7. Find the cost of 8 balloons at 9¢ each. 72¢

8. Find the cost of 8 red pencils at 8¢ each. 64¢

9. Find the cost of 9 bus tickets at 9¢ each. 81¢

Have pupils study own multiplication tables first, as preparation for discovery of new facts from previously learned ones (ex. 1-5). Reinforce meanings by having pupils prove facts by addition. Post new facts on tables, thus completing them. Review all facts on 8's and 9's now.

The 8's and 9's in Multiplication

1. On page 168 you learned 3 new multiplication facts for the 8's. Here are all the 8's facts together:

8	0	8	1	8	2	8	3	8	4
0	8	1	8	2	8	3	8	4	8
0	0	8	8	16	16	24	24	32	32

8	5	8	6	8	7	8	9	8
5	8	6	8	7	8	9	8	8
40	40	48	48	56	56	72	72	64

2. There are 19 facts for the 9's, too, but only one of them is new. Here are all the 9's facts together:

9	0	9	1	9	2	9	3	9	4
0	9	1	9	2	9	3	9	4	9
0	0	9	9	18	18	27	27	36	36

9	5	9	6	9	7	9	8	9
5	9	6	9	7	9	8	9	9
45	45	54	54	63	63	72	72	81

Multiply. Give the answers as quickly as you can:

3.	9	7	8	3	8	3	9	8	9
	5	9	8	8	5	9	8	7	6
	45	63	64	24	40	27	72	56	54
4.	8	1	8	6	2	4	7	0	9
	6	9	9	9	8	9	8	8	9
	48	9	72	54	16	36	56	0	81
5.	9	8	6	9	5	9	4	2	5
	4	4	8	3	8	7	8	9	9
	36	32	48	27	40	63	32	18	45

6. Multiply ex. 3 and 4 again and add 4 to each answer. Write the answers this time. The first one is 49.*

*See G-59 for answers. Have pupils study facts in ex. 1-2 first. Then use ex. 3-5 to spot-check class or individual weaknesses. Group pupils for drill, using a number wheel (figures 0 through 9 around circle, 8 or 9 in center).

Use 8's and 9's in multiplication of 2-figure and 3-figure numbers.

Using the 8's and 9's

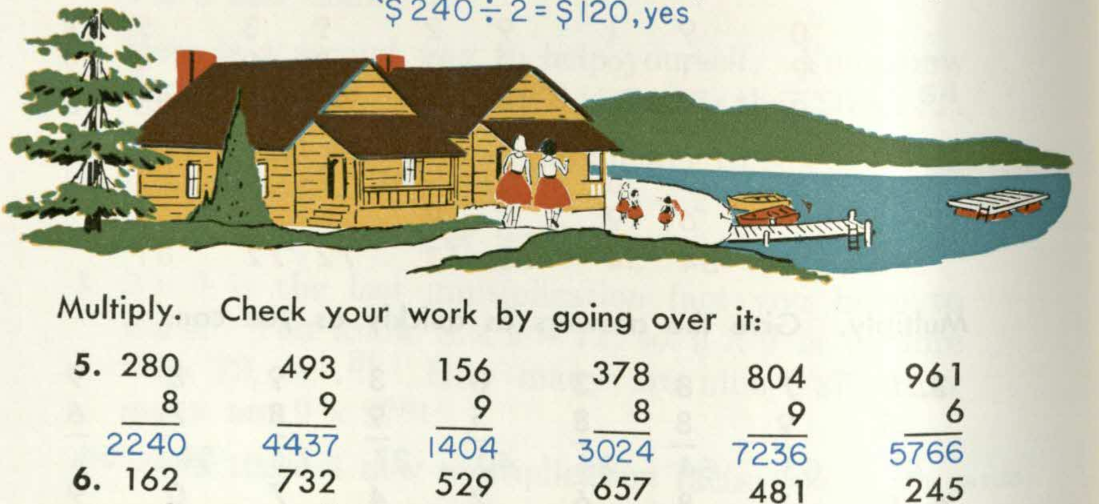
1. At Pine Camp 8 girls live in each cottage. The 16 cottages were all full last year. How many girls were at Pine Camp? 128

2. The cost of staying at Pine Camp is $30 a week. Ann wants to stay 8 weeks next summer. How much will that cost? $240

3. Ann has been saving $15 a month for the last 9 months. How much money has Ann saved? $135

4. Ann's father will pay half the cost and Ann will save enough to pay the other half. Has Ann saved enough so far? Will she have any extra money? Yes, $15

$240 ÷ 2 = $120, yes



Multiply. Check your work by going over it:

5. 280	493	156	378	804	961
8	9	9	8	9	6
2240	4437	1404	3024	7236	5766
6. 162	732	529	657	481	245
9	8	8	9	7	8
1458	5856	4232	5913	3367	1960

Multiply each number by 8;⁽¹⁾ then multiply each by 9:⁽²⁾

(1) 688	760	3344	2456	5032	4504
(2) **7.** 86 774	95 855	418 3762	307 2763	629 5661	563 5067
152	592	5056	1160	6296	1712
8. 19 171	74 666	632 5688	145 1305	787 7083	214 1926
416	280	6480	6008	3256	2712
9. 52 468	35 315	810 7290	751 6759	407 3663	339 3051

Group pupils who made mistakes for remedial work. Have pupils do computations orally to determine if errors are caused by multiplication process, facts, or addition (adding by endings). Reteach or drill (number wheel, examples like ex. 6 on page 169, and so on).

First tell whether you add, subtract, multiply, or divide to find the answer. Then work the problem:

1. Jack has 40¢ to spend for bus tickets. How many can he get at 7¢ each? Divide; 5R5¢, 5 tickets

2. Bus tickets used to cost 5¢ each. How many tickets could Jack get for 40¢ at that time? Divide; 8

3. Of the 36 pupils in Jane's room only 28 were present today. The others were sick. How many were sick? Subtract; 8

4. In a game Andy made these points: 8, 13, 9, 6, 15. Find Andy's score in this game. Add; 51

5. The old school bus could carry 44 children. The new one can carry 52. How many more children can the new bus carry than the old one? Subtract; 8

6. Tom had $32.75 in the bank. Today he put in $4.85. Now how much does he have in the bank? Add; $37.60

7. Mother bought 8 doz. rolls for Betty's party. At $.27 a dozen, how much did the rolls cost? Multiply; $2.16

8. One day Bill pulled 360 carrots. He tied them in bunches with 7 carrots in each bunch. How many bunches were there? Divide; 51R3, or 51 bunches Were any carrots left over? Yes, 3

9. Peter and John each had 230 stamps. Then John bought 75 more stamps. How many has he now? Add; 305 stamps

10. Mary took 5 girls to the movies. She bought 6 movie tickets at $.48 each. How much did the tickets cost? Multiply; $2.88

11. George's grandfather was born in 1898. How many years ago was that? Subtract

Let pupils work independently. If anyone seems to have difficulty in deciding on process, urge him to restate problem in simpler words. Then discuss solutions with pupils. Have them give reason for process used.

Teach even division facts of 8's.

Dividing by 8

1. The 24 children at Ann's party played guessing games. There were 8 children at each table. How many tables were there?3 How many 8's make 24?3 How many are 24 ÷ 8?3

2. If you know the multiplication facts for 8, you do not need a picture to help you with the division facts. Think, "3 × 8 = 24, so there are three 8's in 24."

3. How many 8's make 32?4 How many are 32 ÷ 8?4

Tell what numbers should be put in the spaces:

4. 7 . . . × 8 = 56, so there are 7 . . . 8's in 56.

5. 9 . . . × 8 = 72, so there are 9 . . . 8's in 72.

6. 6 . . . × 8 = 48, so there are 6 . . . 8's in 48.

7. 8 . . . × 8 = 64, so there are 8 . . . 8's in 64.

8. Learn these new division facts: Make flash cards for drill.

$$\begin{array}{r} 0 \\ 8\overline{)0} \end{array} \qquad \begin{array}{r} 1 \\ 8\overline{)8} \end{array} \qquad \begin{array}{r} 2 \\ 8\overline{)16} \end{array} \qquad \begin{array}{r} 3 \\ 8\overline{)24} \end{array} \qquad \begin{array}{r} 4 \\ 8\overline{)32} \end{array}$$

$$\begin{array}{r} 5 \\ 8\overline{)40} \end{array} \qquad \begin{array}{r} 6 \\ 8\overline{)48} \end{array} \qquad \begin{array}{r} 7 \\ 8\overline{)56} \end{array} \qquad \begin{array}{r} 8 \\ 8\overline{)64} \end{array} \qquad \begin{array}{r} 9 \\ 8\overline{)72} \end{array}$$

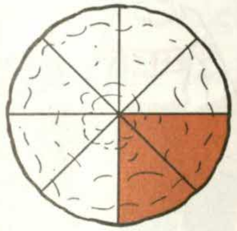
9. How many 8-cent candy bars can I buy for 16¢?2

10. How many tickets at 8¢ each can I buy for 56¢?7

Let pupils use own multiplication tables to discover facts. Have them verify facts in ex. 8 by giving related multiplication fact and by subtraction. After facts are learned, provide practice on them, using number wheel (see G-60, 61).

Teach how to find $\frac{1}{8}$ of a number. Teach relationship between fourths and eighths: use flannelboard and fractional parts; have pupils use own fractional kits (ex. 6–8).

One Eighth



1. This cake is cut into 8 equal pieces. What part of the whole cake is each piece? One eighth How do you write this fraction? $\frac{1}{8}$ Write the fraction that shows the number of eighths in the whole cake. $\frac{8}{8}$

2. Draw dots on paper to show that $\frac{1}{8}$ of 24 dots equals . 3 . dots. How many are $\frac{1}{8}$ of 24? 3 How many are $24 \div 8$? 3

Demonstrate and emphasize.

To find $\frac{1}{8}$ of a number, divide it by 8.

3. Find $\frac{1}{8}$ of 40; 5 64; 8 16; 2 32; 4 72; 9 56; 7 8; 1 24; 3 48 6

Divide these numbers by 8: Ask pupils what part of number are they finding in ex. 4–5.

4. 880 110 248 31 720 90 808 101 328 41 488 61

5. 160 20 400 50 648 81 560 70 728 91 888 111

6. Look at the cake in ex. 1. What part of the cake is red? One fourth Give your answer in fourths. What part of the cake is not red? Three fourths

7. Do ex. 6 again and give your answers in eighths. Two eighths ; six eighths This shows that $\frac{1}{4} = \frac{2}{8}$ and that $\frac{3}{4} = \frac{6}{8}$. Can you tell from the cake in ex. 1 what part of $\frac{1}{4}$ is equal to $\frac{1}{8}$? One half

8. Draw a square and divide it into 4 equal parts. Then draw lines to divide the square into 8 equal parts. Does $\frac{1}{4}$ of the square equal $\frac{2}{8}$ of the square? Yes Does $\frac{3}{4}$ of the square equal $\frac{6}{8}$ of the square? Yes

Use flannelboard to demonstrate in ex. 1 and to show that denominator represents number of parts into which object has been broken. Develop concept, boxed above, through use of objects and point out that the denominator is the divisor.

Present word problems related to trip to zoo.

Fun at the Zoo

1. At Sunset Zoo, Peggy and Jack saw 3 elephants, 7 bears, 4 seals, 3 giraffes, 1 turtle, 24 deer, and 16 monkeys. How many animals did they see in all? 58

2. Jack liked the seals best. He wanted to see the keeper feed them at 2:15. It was only 12:50 when the children walked by the pool. How long would it be before the seals were fed? 1 hr. 25 min.

3. From 1:00 to 1:45 Jack and Peggy rode on the merry-go-round 5 times. Each child paid $.15 a ride for 5 rides. How much did each one pay to ride on the merry-go-round? $.75

4. After they left the merry-go-round, the children learned that they could have bought 5 tickets for $.65. If they had known this, how much could each one have saved? $.10

5. At 2:15 Peggy and Jack watched the keeper throw fish to the seals. Out of 24 fish, the seals caught all but 2. How many fish did they catch? 22

Let different pupils read problems orally. Ask volunteers for process to be used, and reason for choosing it. Then have class solve problem. Have pupils make up own problems, as suggested in ex. 11, for partners to solve.

6. The children saw a very big turtle that weighed 275 pounds. Jack weighs 55 pounds. Did that turtle weigh 4 times or 5 times as much as Jack? 5

7. A sign told the children that the turtle was born in 1915. Peggy once read that a turtle often lives to be 350 years old. If this turtle lives 350 years, until what year will it live? 2265

8. Peggy enjoyed watching the monkeys. Of the 16 monkeys, there were 3 very young ones. How many older monkeys were there? 13

9. In the elephant house there were 3 elephants. The largest elephant weighed 7500 pounds, the next weighed 6200 pounds, and the baby elephant weighed 500 pounds. How many pounds all together was the weight of the three elephants? 14,200

10. Half of the 24 deer were born last spring. How many deer were born last spring? 12

11. Have you been to the zoo this year? If you have, tell the class about the animals you saw there. Try to make a problem about the animals you saw.

Reteach function of remainder in division. Teach some uneven division facts of 8's.

Watching the Remainder

1. At 8¢ each, how many cream puffs can Sally buy for 65¢? 8 Think this way, "Eight 8's are 64, which is **close to** 65 but **smaller than** 65." Write the work as shown at the right. Sally can get 8 cream puffs.

$$\begin{array}{r} 8 \\ 8\overline{)65} \\ \underline{64} \\ 1 \end{array}$$

What does the remainder 1 mean? 1 cent You see that the **remainder** is **smaller** than 8.

2. Suppose you thought there were nine 8's in 65. Then, when you multiply you get 72, which is too large to be subtracted from 65. Can 9 be the right answer? No

$$\begin{array}{r} 9 \\ 8\overline{)65} \\ \underline{72} \end{array}$$

Demonstrate further and emphasize reason.

Watch the number to be subtracted. If it is larger than the number above it, the quotient figure is too large.

3. Look at the examples below. If an example is wrong, tell why. Then work the example the right way. Always watch both the remainder and the number to be subtracted. Only example 2 is correct; see G-62 for discussion of corrected answers.

$$\begin{array}{rrrrr} 8 & 5 & 7 & 8 & 7 \\ 8\overline{)60} & 8\overline{)42} & 8\overline{)68} & 8\overline{)58} & 8\overline{)50} \\ \underline{64} & \underline{40} & \underline{56} & \underline{64} & \underline{56} \\ & 2 & 12 & 4 & \end{array}$$

4. How many 8-cent soap bars can you buy for 25¢? 3, 1¢ left How many can you buy for 55¢? 6, 7¢ left for 30¢? 3, 6¢ left for 35¢? 4, 3¢ left

5. How many 8's are there in 7? 0 R7 in 11? 1 R3 in 45? 5 R5 in 70? 8 R6

In ex. 1 use "7" as quotient to show "why" remainder must be smaller than divisor. Lead pupils to see that new remainder (9¢) shows that 1 more cream puff could be bought, or that there is 1 more 8 in 65. Stress meanings in ex. 2-3.

Provide extensive practice in uneven division facts of 8's.

How Many Are Left Over?

Divide by 8. Give the quotients and remainders:

1. 22 2R6 69 8R5 31 3R7 52 6R4 13 1R5 37 4R5 61 7R5 4 0R4
2. 76 9R4 34 4R2 73 9R1 27 3R3 78 9R6 44 5R4 53 6R5 2 0R2
3. 39 4R7 66 8R2 17 2R1 51 6R3 12 1R4 38 4R6 74 9R2 1 0R1
4. 10 1R2 19 2R3 33 4R1 77 9R5 43 5R3 21 2R5 15 1R7 6 0R6
5. 28 3R4 71 8R7 79 9R7 23 2R7 18 2R2 59 7R3 67 8R3 3 0R3

6. Mary has 45 pictures to put in her new book. She can put 8 pictures on each page. How many full pages will she need for 45 pictures? 5R5 How many pictures will go on the next page? 5

7. Last winter Mary took 72 pictures. How many pages in her book did these pictures fill? 9

8. Mary's book has 64 pages. If she puts 8 pictures on every page, how many will her book hold? 512

Divide. Find the quotients and remainders:

9. 8)57 7R1 8)36 4R4 8)47 5R7 8)14 1R6 8)60 7R4 8)75 9R3 8)9 1R1
10. 8)46 5R6 8)54 6R6 8)26 3R2 8)58 7R2 8)35 4R3 8)45 5R5 8)5 0R5
11. 8)49 6R1 8)29 3R5 8)63 7R7 8)70 8R6 8)41 5R1 8)62 7R6 8)7 0R7

Have pupils explain some examples orally to check understandings. Have them explain why remainder must be smaller than divisor. Use number wheel (see G-60, 61) to reinforce uneven facts.

Extend division of 4-figure numbers by 8. Stress place value of all figures and reasons for proper placement of quotient figures.

Dividing Larger Numbers

1. Eight rooms at school shared the cost of a new slide for the playground. The slide cost $78.80. What was the share each room had to pay? $9.85

2. Eight girls spent $2.88 to buy things for a picnic. They shared the cost equally. How much was each girl's share of the cost? $.36

3. Suppose that two girls in ex. 2 could not go to the picnic. Then the rest would share the cost equally. How much would each one's share be then? $.48

Find the quotients and remainders, if any. Check:

4.	90R5 8)725	61 8)488	77 8)616	247 8)1976	339R3 8)2715
5.	42R1 8)337	114 8)912	33 8)264	935 8)7480	512 8)4096
6.	85R5 8)685	48 8)384	54 8)432	488 8)3904	751 8)6008
7.	69 8)552	123R7 8)991	37R6 8)302	313 8)2504	776R4 8)6212
8.	112 8)896	26 8)208	72 8)576	678 8)5424	911R2 8)7290

Divide these money numbers by 8:

9.	$.12 $.96	$.45R3¢ $3.63	$3.12R4 $25.00
10.	$.05R5¢ $.45	$.86R2¢ $6.90	$1.73 $13.84
11.	$.11 $.88	$.57R3¢ $4.59	$4.96 $39.68
12.	$.11R2¢ $.90	$.90R3¢ $7.23	$23.59 $2.94R7¢

Provide oral and written practice in all processes.

Review Practice

Multiply each number by 8;(1) by 9;(2) by 6;(3) by 3.(4)* Check:

(1),(2) 296,333 1664,1872 3648,4104 1576,1773 2632,2961 4480,5040
(3) **1.** 37 222 208 1248 456 2736 197 1182 329 1974 560 3360

752,846 5368,6039 4160,4680 6680,7515 5936,6678 3344,3762
2. 94 564 671 4026 520 3120 835 5010 742 4452 418 2508

656,738 2352,2646 1544,1737 3744,4212 2448,2754 6008,6759
3. 82 492 294 1764 193 1158 468 2808 306 1836 751 4506

632,711 2936,3303 7320,8235 6800,7650 1136,1278 6688,7524
4. 79 474 367 2202 915 5490 850 5100 142 852 836 5016

*(4) Ex. 1: 111, 624, 1368, 591, 987, 1680; ex. 2: 282, 2013, 1560, 2505, 2226, 1254; ex. 3: 246, 882, 579, 1404, 918, 2253; ex. 4: 237, 1101, 2745, 2550, 426, 2508

Copy in columns, add, and check:

5. 37, 35, 56, 43 171
6. 88, 19, 62, 70 239
7. 64, 55, 64, 39 222

8. \$6.34 + \$7.55 + \$2.38 \$16.27
9. \$6.68 + \$7.75 + \$4.15 \$18.58
10. \$2.66 + \$4.78 + \$2.59 \$10.03

Find the answers. Watch the signs: Emphasize.

11. 63 ÷ 7 9 218 ÷ 6 36R2 416 ÷ 8 52 8 × 247 1976
12. 92 ÷ 8 11R4 300 − 8 292 9 × 306 2754 904 ÷ 8 113
13. 53 + 9 62 179 + 5 184 80 − 42 38 60 − 34 26
14. 27 − 8 19 133 ÷ 7 19 7 × 869 6083 9 × 452 4068
15. 18 × 9 162 148 × 6 888 395 ÷ 4 98R3 532 ÷ 7 76
16. 40 − 7 33 420 ÷ 5 84 8 × 409 3272 238 + 6 244

Subtract these numbers. Check the work:

17. 4966 6800 7987 6803 9600
3787 4676 1695 5012 8369
1179 2124 6292 1791 1231

18. 7669 2503 7901 4262 8668
3785 1207 4499 1720 2473
3884 1296 3402 2542 6195

Urge better pupils to do some examples orally. Help pupils who made mistakes to analyze errors. Provide for special drills or remedial work as needed.

Teach even division facts of 9's.

Dividing by 9

1. Cover the answers to the 9's facts in ex. 2 on page 169 and try to give them quickly. These multiplication facts for 9 will help you in learning the division facts for 9.

2. How many are three 9's? 27 How many are 27 ÷ 9? 3
How many are $9\overline{)27}$? 3

3. How many 9's make 36? 4 How many are 36 ÷ 9? 4

Tell what numbers should be put in the spaces:

4. $\overset{6}{\ldots}\times 9 = 54$, so there are .6. 9's in 54.

5. $\overset{9}{\ldots}\times 9 = 81$, so there are .9. 9's in 81.

6. $\overset{7}{\ldots}\times 9 = 63$, so there are .7. 9's in 63.

7. $\overset{8}{\ldots}\times 9 = 72$, so there are .8. 9's in 72.

8. Learn these new division facts:

$\overset{0}{9\overline{)0}}$ $\overset{1}{9\overline{)9}}$ $\overset{2}{9\overline{)18}}$ $\overset{3}{9\overline{)27}}$ $\overset{4}{9\overline{)36}}$

$\overset{5}{9\overline{)45}}$ $\overset{6}{9\overline{)54}}$ $\overset{7}{9\overline{)63}}$ $\overset{8}{9\overline{)72}}$ $\overset{9}{9\overline{)81}}$

9. How many 9-cent balloons can I buy for 45¢? 5

10. How many 9-cent crayons can I buy for 27¢? 3

Give the answers:

11. 18 ÷ 9 2 45 ÷ 9 5 9 ÷ 9 1 63 ÷ 9 7

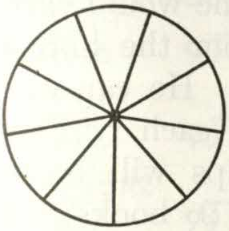
12. 27 ÷ 9 3 54 ÷ 9 6 36 ÷ 9 4 18 ÷ 9 2

13. 63 ÷ 9 7 72 ÷ 9 8 81 ÷ 9 9 54 ÷ 9 6

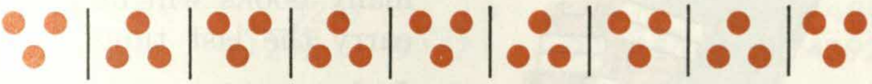
Follow development as written on page. Have pupils verify facts in ex. 8 by subtraction. Conduct class review of all division facts, using flash cards, number wheel, puzzles (what two facts have 18 as their dividend).

Teach how to find $\frac{1}{9}$ of a number.

One Ninth



1. When one thing, like this circle, is divided into 9 equal parts, what is each part called? One ninth Write this fraction. $\frac{1}{9}$ Show how to write two ninths; $\frac{2}{9}$ four ninths; $\frac{4}{9}$ five ninths. $\frac{5}{9}$



2. When a group of things, like the 27 dots above, is divided into 9 equal parts, what is each part called? One ninth How many are $\frac{1}{9}$ of 27 dots? 3 How many are $27 \div 9$? 3

Emphasize.

To find $\frac{1}{9}$ of a number, divide it by 9.

3. Find $\frac{1}{9}$ of 45; 5 81; 9 18; 2 72; 8 36; 4 54; 6 9; 1 27; 3 63. 7

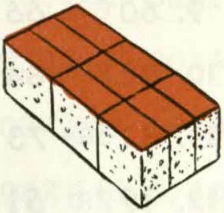
Give the answers:

4. $9\overline{)99}$ 11 $9\overline{)630}$ 70 $9\overline{)990}$ 110 $9\overline{)6399}$ 711 $9\overline{)2790}$ 310

5. $9\overline{)90}$ 10 $9\overline{)729}$ 81 $9\overline{)540}$ 60 $9\overline{)9990}$ 1110 $9\overline{)8199}$ 911

6. Peter bought 9 pencils for 45¢. What was the cost of 1 pencil? 5¢

7. For a party we need 72 pieces of cake. Each cake will be cut into 9 pieces, as shown at the right. How many cakes do we need so that we will have 72 pieces? 8



Use objects (if needed) to develop concept that to find $\frac{1}{9}$ of a number, divide by 9. Stress fact that the denominator is the divisor.

Teach uneven division facts of 9's.

Finding Remainders

1. Bill said he would carry 32 books from the library to his class. He can carry 9 books on each trip. How many trips will he make carrying 9 books? 3 How many books will be left to carry the last time? 5

2. Jack is taking 40 books to the library. He can carry 9 books on each trip. How many trips does Jack need to make with a full load of 9 books? 4 How many books will be left to carry the last time? 4

Divide by 9. Find the quotients and the remainders:

3. 41 4R5 53 5R8 62 6R8 23 2R5 15 1R6 34 3R7 29 3R2 4 0R4

4. 58 6R4 77 8R5 26 2R8 69 7R6 47 5R2 21 2R3 13 1R4 7 0R7

5. 86 9R5 11 1R2 32 3R5 57 6R3 80 8R8 25 2R7 38 4R2 1 0R1

6. 10 1R1 70 7R7 65 7R2 52 5R7 39 4R3 67 7R4 42 4R6 3 0R3

7. 44 4R8 35 3R8 49 5R4 14 1R5 20 2R2 61 6R7 50 5R5 6 0R6

8. 75 8R3 87 9R6 56 6R2 33 3R6 89 9R8 79 8R7 46 5R1 2 0R2

9. 60 6R6 66 7R3 78 8R6 82 9R1 74 8R2 85 9R4 71 7R8 5 0R5

10. 22 2R4 84 9R3 40 4R4 88 9R7 68 7R5 37 4R1 55 6R1 8 0R8

11. 31 3R4 73 8R1 12 1R3 48 5R3 83 9R2 76 8R4 24 2R6 17 1R8

12. 19 2R1 51 5R6 59 6R5 43 4R7 28 3R1 16 1R7 64 7R1 30 3R3

If pupils have difficulties, remind them of helping numbers (next smaller number that can be divided by 9 evenly). Use same dividends to recheck pupils' accuracy on uneven facts of 8, 7, and so on.

Provide practice material in division by 9, and continue to develop division skill.

Dividing by 9

Divide and check:

1. $\overset{94}{9\overline{)846}}$ $\overset{22}{9\overline{)198}}$ $\overset{42}{9\overline{)378}}$ $\overset{568}{9\overline{)5112}}$ $\overset{926R2}{9\overline{)8336}}$

2. $\overset{64}{9\overline{)576}}$ $\overset{56R5}{9\overline{)509}}$ $\overset{74}{9\overline{)666}}$ $\overset{714R8}{9\overline{)6434}}$ $\overset{835}{9\overline{)7515}}$

3. $\overset{95R2}{9\overline{)857}}$ $\overset{57R4}{9\overline{)517}}$ $\overset{46R6}{9\overline{)420}}$ $\overset{595}{9\overline{)5355}}$ $\overset{149}{9\overline{)1341}}$

4. $\overset{26}{9\overline{)234}}$ $\overset{32R7}{9\overline{)295}}$ $\overset{19}{9\overline{)171}}$ $\overset{784}{9\overline{)7056}}$ $\overset{488}{9\overline{)4392}}$

5. There are 225 seats in rows with 9 seats in each row. How many rows of seats are there? 25

6. Nine boys divided 400 stamps equally. How many stamps did each boy get? 44 Were any left over? 4

7. Nine girls shared the cost of a valentine party. They spent $6.75 all together. What was each girl's share of the cost? $.75

8. George worked for Mr. Hill last week. In 9 hr. he earned $5.85. How much an hour did George earn? $.65

Divide each number by 9 and check:

9. 468 52 808 89R7 729 81 639 71 2046 227R3 7000 777R7

10. 351 39 432 48 283 31R4 486 54 1242 138 2403 267

11. 873 97 607 67R4 387 43 528 58R6 6165 685 8352 928

12. 558 62 756 84 229 25R4 701 77R8 1953 217 8046 894

13. 827 91R8 447 49R6 390 43R3 315 35 2034 226 3040 337R7

14. 327 36R3 711 79 539 59R8 684 76 3987 443 5729 636R5

Pupils who show mastery of division may omit this work. Group others for special help. Have them explain work orally, stressing place value. They need not do entire page.

Note that 1 is the identity element for division as well as for multiplication.

Dividing by 1

1. Tom took in \$7 selling books at \$1 apiece. How many books did Tom sell? 7 How many are 7 ÷ 1? 7

2. Mary has 9 apples. She will give 1 apple to as many children as she can. How many children will get 1 apple? 9 How many are 9 ÷ 1? 9 How many are $1\overline{)9}$? 9

3. Here are all the facts when you divide by 1:

$\begin{array}{r}0\\1\overline{)0}\end{array}$ $\begin{array}{r}1\\1\overline{)1}\end{array}$ $\begin{array}{r}2\\1\overline{)2}\end{array}$ $\begin{array}{r}3\\1\overline{)3}\end{array}$ $\begin{array}{r}4\\1\overline{)4}\end{array}$

$\begin{array}{r}5\\1\overline{)5}\end{array}$ $\begin{array}{r}6\\1\overline{)6}\end{array}$ $\begin{array}{r}7\\1\overline{)7}\end{array}$ $\begin{array}{r}8\\1\overline{)8}\end{array}$ $\begin{array}{r}9\\1\overline{)9}\end{array}$

If you divide any number by 1, the answer is the same as that number.

Oral Practice

4. Add 5 to each number; (1) add 8; (2) add 7; (3) add 9: (4)

(1),(2)	42,45	74,77	57,60	96,99	53,56	79,82	30,33	91,94
	37	69	52	91	48	74	25	86
(3)	44	76	59	98	55	81	32	93
(4)	46	78	61	100	57	83	34	95

5. Subtract 5 from each number in ex. 4; (1) subtract 20. (2) (1) 32, 64, 47, 86, 43, 69, 20, 81; (2) 17, 49, 32, 71, 28, 54, 5, 66

6. Tell the minutes between 4:56 and 5:05. 9

Give the answers:

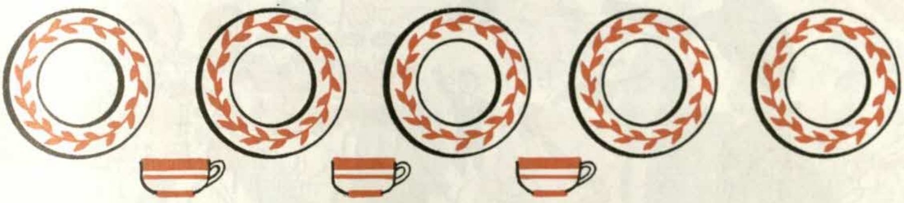
7. (8 × 8) + 5 69 7 + (9 × 1) 16 (3 × 9) + 1 28

8. (9 × 7) + 3 66 2 + (6 × 9) 56 (9 × 9) + 8 89

Use subtraction to prove facts in ex. 3 and to develop generalization, boxed above. Have pupils also prove facts by multiplication. In ex. 4-5, 7-8, let different pupils act as the teacher, calling on others.

Teach new subtraction concept.

Comparing Numbers



1. How many plates do you see? 5 How many cups? 3 How many more plates than cups are there? 2

2. Jane is 9 years old. Jane's sister is 15 years old. How much younger is Jane than her sister? 6 years

3. Hill School was built in 1954. Park School was built in 1948. How many years older is Park School than Hill School? 6

4. Tom's sled is 48 in. long. Ann's sled is 30 in. long. How many inches longer is Tom's sled than Ann's? 18

5. Our school is 38 ft. high. The flagpole on the playground is 50 ft. high. How many feet higher is the flagpole than our school? 12

6. One record costs $3.50. Another record costs $2.75. What is the difference in the prices? $.75

7. Last year it cost $19.75 to stay a week at camp. This year it will cost $22.50. How much less did it cost last year than this year to stay a week at camp? $2.75

Emphasize in other problems.↓

When you find how much more or less one number is than another, you are comparing the numbers. You can compare two numbers by finding the difference between them.

Do problems orally with class, discussing in what way the numbers are being compared. Have pupils keep list of ways in which they compare numbers during set period, and report findings to class.

Extend place value and number reading to six figures.

Large Numbers

1. Jane read that there were 23,500 people looking at the big parade yesterday. Jane knew this number was a large one but she did not know how to read it. How many places has 23,500? 5

2. A **5-place** number like 23,500 is read 23 thousand 5 hundred. It means 23 thousands, 5 hundreds, no tens, no ones.

3. The number 48,673 is read 48 thousand 6 hundred 73. It means 48 thousands, 6 hundreds, 7 tens, 3 ones.

4. A comma is put after the thousands in a 5-place number to make it easier to read. In a 4-place number like 1958, the comma is often left out.

5. Read these numbers and tell what each means: See G-65.

70,860 45,201 95,624 31,179 28,063

6. Write the numbers in ex. 5 as your teacher reads them. Remember the comma comes when she says "thousand." How many figures must come after the comma? 3

7. Count by 10,000's to 90,000, like this: 10,000; 20,000; and so on. 10,000; 20,000; 30,000; 40,000; 50,000; 60,000; 70,000; 80,000; 90,000

See G-65 for prelesson review of place value of 4-place numbers. Show numbers in ex. 1-3 on abacus and place-value diagram. Let different pupils show numbers in ex. 5 on abacus, while others use place-value diagrams.

8. The number 45,267 is read 45 thousand 2 hundred 67. 45 means 4 tens and 5 ones. So 45 thousand means 4 ten-thousands and 5 one-thousands. The fifth figure at the left is in ten-thousands place. You can say that 45,267 means 4 ten-thousands, 5 thousands, 2 hundreds, 6 tens, 7 ones.

9. Here is a way to show the meaning of 45,267:

4 is in ten-thousands place and means 40,000
5 is in thousands place and means 5,000
2 is in hundreds place and means 200
6 is in tens place and means 60
7 is in ones place and means 7
45,267

10. Count by 10,000's from 80,000 to 120,000, like this: 80,000; 90,000; 100,000; and so on.

80,000; 90,000; 100,000; 110,000; 120,000

11. You see that there are some **6-place** numbers in ex. 10. The sixth figure at the left is in hundred-thousands place. The number 428,536 means 4 hundred-thousands, 2 ten-thousands, 8 thousands, 5 hundreds, 3 tens, and 6 ones. You read it "428 thousand 536."

12. Read each number. Then tell what it means:

3 thousand, 8 hundred 25; 3 thousands, 8 hundreds, 2 tens, 5 ones

See G-66 for others.

3825   67,823   90,058   273,194   537,204

Again, use abacus and place-value diagram to demonstrate in ex. 8. Have pupils write numbers in ex. 12, as done in ex. 9, and on place-value diagram. Give more practice in reading large numbers, found in newspapers.

Provide review in addition involving carrying.

Adding Numbers

Add these numbers and check your work: Stress checking.

1.	4576	3518	$13.32	$57.26	$48.82
	1404	3325	67.68	94.80	.98
	2219	1846	52.74	38.77	2.63
	3432	2028	57.14	14.13	10.54
	11,631	10,717	$190.88	$204.96	$62.97
2.	7398	5214	$17.47	$22.55	$24.63
	9064	4892	5.12	35.64	.74
	2527	3458	63.59	6.37	5.19
	5675	4637	13.85	75.68	24.84
	24,664	18,201	$100.03	$140.24	$55.40

3. The children in Miss Wood's room are saving money in the school bank. In the last four weeks they have saved $28.75, $19.50, $23.95, and $29.65. How much have they saved in four weeks? $101.85

4. The children in Miss Hill's room have saved $17.25, $20.75, $26.85, and $25.40. How much have they saved in four weeks? $90.25

5. Find the sum of 48, 39, 72, 50, 37, and 84. 330

6. Find the sum of 388, 69, 4247, and 528. 5232

Copy in columns, add, and check:

7. 3 + 7 + 5 + 8 + 8 31 65 + 28 + 19 + 21 133

8. 3 + 5 + 7 + 6 + 7 28 86 + 17 + 44 + 70 217

9. 5 + 7 + 6 + 5 + 9 32 68 + 50 + 47 + 35 200

10. 7 + 6 + 8 + 1 + 7 29 36 + 93 + 59 + 43 231

11. 9 + 6 + 7 + 6 + 0 28 68 + 95 + 83 + 98 344

More Practice. See ㉔ on page 321.

Let pupils work independently in ex. 1-6. Note difficulties in carrying, facts, endings, money numbers. Use "More Practice" for further review or reteaching. Urge children to do ex. 7-11 mentally, without pencil and paper.

Extend regrouping in subtraction to triple regrouping.

Subtracting Large Numbers

1. **Problem** Jim's father drove 4283 miles on a trip. He drove 2296 miles to go to High Point and the rest to come home. How far was the trip home? 1987 miles

Explanation In this example you borrow 3 times.

$$\begin{array}{r} \overset{3}{\cancel{4}}\overset{\overset{11}{\cancel{1}}}{\cancel{2}}\overset{\overset{17}{\cancel{7}}}{\cancel{8}}\overset{13}{\cancel{3}} \\ \underline{2296} \\ 1987 \end{array}$$

Think, "13 − 6 = 7." Write 7 in ones place. Think, "17 − 9 = 8." Write 8 in tens place. Think, "11 − 2 = 9." Write 9 in hundreds place. Think, "3 − 2 = 1." Write 1 in thousands place. The answer is 1987. The trip home was 1987 miles.

2. **Problem** Ann's father drove 4000 miles to Grand City and back. He drove 2765 miles to go there. How many miles did he drive back? 1235

Explanation Watch the zeros in this example.

It is best to change 4000 to 3990 + 10 and write it as shown at B. Think, "10 − 5 = 5." Write 5. Think, "9 − 6 = 3." Write 3. Think, "9 − 7 = 2." Write 2. Think, "3 − 2 = 1." Write 1. Ann's father drove 1235 miles to get home from Grand City.

$$\begin{array}{rcr} \textbf{A} & & \textbf{B} \\ 4000 & & 399\overset{10}{0} \\ \underline{2765} & & \underline{2765} \\ & & 1235 \end{array}$$

Subtract and check your work: Have pupils explain work orally.

$$\begin{array}{lrrrrrr} \textbf{3.} & 7245 & 5122 & 9374 & 6000 & 4000 & 7000 \\ & \underline{3367} & \underline{2648} & \underline{4795} & \underline{4487} & \underline{2234} & \underline{4158} \\ & 3878 & 2474 & 4579 & 1513 & 1766 & 2842 \end{array}$$

More Practice. See ㉕ on page 321. Use to reinforce skill.

To the Teacher. See page 329 for the additive method of subtraction.

Review single and double regrouping using pocket chart or children (see pages 29-31, and G-17). In ex. 1, be sure pupils understand exchange of thousands, hundreds, tens. Let pupils use helping numbers in ex. 3, if needed.

Correlate problem solving, using all processes, with social studies.

Studying Other Lands

1. The children in Ann's room are making books to tell about other countries. Ann used 24 sheets of paper to make her book. Each sheet made 4 pages. How many pages are there in Ann's book? 96

2. Jim used 32 sheets of paper for his book. Each sheet made 4 pages. How many pages all together are there in Jim's book? 128

3. How many more pages are there in Jim's book than in Ann's? 32 Use the answers to ex. 1 and 2.

4. Ann has some post cards to put in her book. She has 8 cards from Mexico, 3 cards from India, 7 from Norway, 12 from Holland, and 6 from Japan. How many cards has Ann all together? 36

5. Suppose Ann puts 4 cards on a page of her book. How many pages will she use for 36 cards? 9

6. Jim has 24 cards from other countries. He will put only 3 cards on a page of his book. How many pages will he use for 24 cards? 8

Remind pupils to read problems carefully, to determine what facts are given, what the problem asks, what process should be used, how should it be written in numbers. In discussing answers, have pupils give reasons for process used.

7. Jim wants to write a story about children in Holland. Miss King told him there is a television program about Holland on Mondays at 7:15 P.M. It runs 15 minutes. At what time does this program end? 7:30P.M

8. The children have a book table. This week all the books are about other lands and people. There are 2 books about Japan, 4 about Mexico, 3 about Holland, 1 about India, and 2 about Norway. How many books are there on the book table? 12

9. Betty has cut out pictures of people in different countries. She has 14 pictures of children, 12 pictures of families, and 17 pictures of men and women. How many pictures has Betty cut out? 43

10. Jack is making a page to show how far it is from America to some other countries. He looked up the distances by boat from New York. He found these numbers of miles:

To Japan, 9700 miles	To Mexico, 1941 miles
To India, 8178 miles	To Holland, 3483 miles

Which one of these countries is the longest distance from New York? Japan Which one is nearest to New York? Mexico

11. Look at the distances in ex. 10. How much farther from New York is Japan than Mexico? 7759 miles How much nearer to New York is Holland than India? 4695miles

Use ex. 10 to develop concept of time, and awareness that distance is thought of in terms of method of travel and time, not miles alone.

Present review of subtraction involving regrouping.

Subtracting Numbers

Subtract these numbers and check your work:

1.	7371	9292	9377	$81.22	$63.57
	3784	2695	5698	25.84	38.78
	3587	6597	3679	$55.38	$24.79
2.	9224	7325	8764	$60.00	$72.32
	8798	2398	1875	24.14	43.36
	426	4927	6889	$35.86	$28.96
3.	6258	7260	9731	$83.77	$95.24
	4469	1693	8958	57.79	19.98
	1789	5567	773	$25.98	$75.26
4.	6643	9321	7610	$92.75	$30.00
	5694	3442	6919	77.98	10.72
	949	5879	691	$14.77	$19.28

5. Jack wants a bicycle that costs $42.00. He has saved $28.85 toward it. How much more money does Jack need to save? $13.15

6. Susan bought a bicycle for $33.75. It had been marked down from $39.50. How much did Susan save by getting the bicycle when it was marked down? $5.75

7. How much more is 9875 than 2979? 6896

8. How much less is 2758 than 5255? 2497

9. Find the difference between $76.00 and $56.42. $19.58

Subtract each of these numbers from 8000:

10.	4286	3714	1573	6427	6944	1056	2017	5983	7198	802	3369	4631
*	4967		7680		2309		7236		2055		5884	
11.	5578	2422	7912	88	2036	5964	4561	3439	3245	4755	6807	1193
*	3675		1341		7217		4692		6008		2446	
12.	6794	1206	2483	5517	7325	675	1859	6141	4037	3963	5916	2084
*	2459		6770		1928		7394		5216		3337	

13. Subtract each number in ex. 10–12 from 9253. See starred answers below ex. 10-12.

After checking pupils' work, group those who had mistakes to help them analyze their errors. Determine if triple regrouping, zeros in minuend, and so on, are causing difficulty.

Improve ability in mental arithmetic through oral review.

Oral Practice

Read these numbers:

1. 4817 52,147 20,004 219,600 189,247

2. 1960 13,068 87,016 435,094 584,071

3. Make change from $1.00 for things that cost: See G-67.
27¢ 81¢ 35¢ 58¢ 73¢ 9¢ 16¢

In ex. 3, be sure pupils begin at cost of article.

Give the answers:

4. $\frac{1}{8}$ of 400 50 $\frac{1}{8}$ of 568 71 $\frac{1}{9}$ of 819 91 $\frac{1}{9}$ of 360 40

5. $\frac{1}{9}$ of 720 80 $\frac{1}{8}$ of 320 40 $\frac{1}{9}$ of 189 21 $\frac{1}{8}$ of 248 31

6. $\frac{1}{7}$ of 497 71 $\frac{1}{9}$ of 459 51 $\frac{1}{8}$ of 728 91 $\frac{1}{6}$ of 186 31

7. $\frac{1}{8}$ of 640 80 $\frac{1}{6}$ of 360 60 $\frac{1}{7}$ of 350 50 $\frac{1}{9}$ of 270 30

8. $\frac{1}{9}$ of 549 61 $\frac{1}{8}$ of 488 61 $\frac{1}{9}$ of 630 70 $\frac{1}{8}$ of 160 20

9. Multiply each number by 7;(1) by 8;(2) by 9.(3)
(1) 7 49 2 14 0 0 4 28 1 7 8 56 3 21 6 42 9 63 5 35
(2),(3) 56,63 16,18 0,0 32,36 8,9 64,72 24,27 48,54 72,81 40,45

10. Multiply each number by 2;(1) by 3;(2) by 4.(3)
(1) 10 20 21 42 32 64 40 80 12 24 41 82 20 40 42 84
(2),(3) 30,40 63,84 96,128 120,160 36,48 123,164 60,80 126,168

11. Divide each number by 8:
32 4 56 7 40 5 16 2 48 6 72 9 64 8 24 3

12. Divide each number by 9:
72 8 54 6 36 4 81 9 45 5 27 3 18 2 63 7

13. Tell which of these fractions is the smallest. Then tell which is the next smallest, and so on to the largest: $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{6}$. $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$

More Practice. See ㉖ on page 321.

Use this review to spot-check for class or individual weaknesses. Plan for reteaching or drill. If ex. 1-2 cause difficulty, have pupils write the numbers on place-value diagram.

NEWTOWN 15 MI.
HILLTOP 35 MI.

Feet, Yards, Miles

1. Father is driving Bill and Sally to Hilltop. Look at the road sign. It says Hilltop is 35 mi. away. **Mi.** stands for **miles.** A mile is a measure for long distances. The yard, foot, and inch are measures for short lengths. How far is it to Newtown? 15 miles

2. A mile is equal to 5280 ft. or to 1760 yd. Multiply to see whether 1760 yd. equals 5280 ft.

3. Here is a new table of measures of length:

Add to vocabulary chart.

12 inches (in.) = 1 foot (ft.)
3 feet (ft.) = 1 yard (yd.)
5280 ft. or 1760 yd. = 1 mile (mi.)

4. Have you ever walked a mile? Ask someone to tell you some distance that is about 1 mi. Could you walk that distance?

5. Father walks 1 mi. in about 20 min. How many minutes will it take him to walk 3 mi.? 60 How many miles can he walk in 1 hr.? 3

Review inch, foot, and yard measures, stressing that unit used depends on size of object to be measured. Discuss length of blocks in town, number of blocks which make a mile, and distances to adjacent towns. Ask pupils why long distances are expressed in miles, not inches.

Review abbreviations which refer to measures, and equivalences of different measures.

Reviewing Measures

Tell the word that each abbreviation stands for:

1. ft. foot gal. gallon mi. mile in. inch yd. yard min. minute sec. second

2. pt. pint Sat. Saturday qt. quart hr. hour da. day Mon. Monday doz. dozen

Tell what numbers go in the spaces:

3. 1 yd. = 36 in. 1 mi. = 1760 yd. 3 gal. = 12 qt.

4. 1 qt. = 2 pt. 2 hr. = 120 min. 4 min. = 240 sec.

5. 4 yd. = 12 ft. 2 da. = 48 hr. ½ min. = 30 sec.

6. 1 mi. = 5280 ft. 4 qt. = 8 pt. 24 hr. = 1 da.

7. Name two things people buy by the yard.

8. Name two things people buy by the gallon.

9. Name two things people buy by the quart or pint.

10. Name one thing people measure by the foot.

11. Name one thing people measure by the mile.

12. When there is ice on the pond, is the temperature above or below 32°? Below On a hot day in summer is the temperature nearer 40° or 80°? 80°

13. Ann wants to take the bus at 10:12 A.M. She needs 20 min. to walk to the station and to buy a ticket. At what time should Ann leave her house? 9:52 A.M.

14. Andy left the house at 3:20. He went to the post office and was back home by 3:46. How many minutes did the round trip take? 26

Do ex. 1-2 orally. Let pupils complete ex. 3-14 independently.

Use flash cards, showing abbreviations, for drill.

Present diagnostic test of multiplication facts.

The 100 Multiplication Facts

Multiply. Try to give the right products quickly:

1.	5	3	4	2	8	3	0	7	2	1
	2	8	1	0	2	3	5	6	2	7
	10	24	4	0	16	9	0	42	4	7
2.	9	1	7	6	1	4	2	0	3	4
	0	5	3	8	9	5	6	1	5	6
	0	5	21	48	9	20	12	0	15	24
3.	7	5	0	4	6	9	2	8	2	7
	4	8	4	8	0	4	1	9	4	5
	28	40	0	32	0	36	2	72	8	35
4.	7	9	9	5	1	3	3	9	8	5
	1	2	9	6	1	0	4	6	3	9
	7	18	81	30	1	0	12	54	24	45
5.	9	1	4	3	6	1	8	8	7	2
	5	0	2	6	9	6	8	0	8	7
	45	0	8	18	54	6	64	0	56	14
6.	0	5	3	8	3	0	8	6	8	5
	6	4	1	6	9	7	4	2	5	0
	0	20	3	48	27	0	32	12	40	0
7.	9	1	5	0	5	5	2	8	5	4
	7	8	3	0	7	1	8	7	5	9
	63	8	15	0	35	5	16	56	25	36
8.	7	9	3	0	6	2	4	7	6	9
	2	8	7	8	6	3	0	9	3	1
	14	72	21	0	36	6	0	63	18	9
9.	6	0	4	7	1	6	4	6	0	9
	4	2	3	7	2	7	4	1	9	3
	24	0	12	49	2	42	16	6	0	27
10.	3	1	2	8	7	2	1	6	4	0
	2	4	9	1	0	5	3	5	7	3
	6	4	18	8	0	10	3	30	28	0

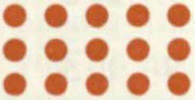
To the Teacher. See the footnotes on pages 7 and 13 and page 328.

See suggestions for pages 7 and 13.

Reteach basic understandings concerning multiplication.

How to Help Yourself

Here are some ways to help yourself if you forget the answer to a multiplication fact.



1. How many are five 3's? 15 How many are three 5's? 15 Look at the dots and count by 3's. 3,6,9,12,15 How many dots are there? 15 Or look at the dots and count by 5's. 5,10,15

2. If you have trouble with the multiplication facts, you can add to find the answer. Five 3's can be written like this: 3 + 3 + 3 + 3 + 3. Add the 3's to get the answer.

3. You see in ex. 1 that both products are the same. The numbers in 5 × 3 are the same as the numbers in 3 × 5 but they are reversed. **If two numbers are reversed, their product is the same.** What is this principle called? Commutative principle

4. Suppose you do not remember the answer to 5 × 7. Reverse the numbers and you get 7 × 5. How many are 7 × 5? 35 Then how many are 5 × 7? 35

5. The zero facts should give no trouble. **If you multiply any number by 0, the product is 0.** How many are 7 × 0? 0 0 × 8? 0

6. The multiplication facts with 1 are easy. Remember that **any number times 1 equals that number.**

7. You may forget the answer to 4 × 7. Then multiply 7 by $\frac{1}{2}$ of 4, which is 2, and double the answer. Think, "2 × 7 = 14. 2 × 14 = 28. So 4 × 7 = 28."

8. Suppose you do not know 6 × 9. Think, "3 × 9 = 27. 2 × 27 = 54. So 6 × 9 = 54."

Have pupils use other facts to show the six helps in finding answers: counting (ex. 1), adding (ex. 2), commutative principle (ex. 3-4), zero principle (ex. 5), facts with 1 (ex. 6), one half and doubling (ex. 7-8).

Present diagnostic test of even division facts.

The 90 Division Facts

Divide. Try to say the right quotients quickly:

1.	$\overset{4}{2\overline{)8}}$	$\overset{0}{9\overline{)0}}$	$\overset{1}{3\overline{)3}}$	$\overset{9}{6\overline{)54}}$	$\overset{5}{5\overline{)25}}$	$\overset{7}{9\overline{)63}}$
2.	$\overset{5}{1\overline{)5}}$	$\overset{3}{3\overline{)9}}$	$\overset{0}{6\overline{)0}}$	$\overset{8}{8\overline{)64}}$	$\overset{9}{5\overline{)45}}$	$\overset{7}{6\overline{)42}}$
3.	$\overset{2}{4\overline{)8}}$	$\overset{1}{1\overline{)1}}$	$\overset{4}{8\overline{)32}}$	$\overset{7}{4\overline{)28}}$	$\overset{9}{7\overline{)63}}$	$\overset{9}{3\overline{)27}}$
4.	$\overset{9}{1\overline{)9}}$	$\overset{3}{2\overline{)6}}$	$\overset{2}{6\overline{)12}}$	$\overset{2}{8\overline{)16}}$	$\overset{6}{3\overline{)18}}$	$\overset{8}{9\overline{)72}}$
5.	$\overset{0}{5\overline{)0}}$	$\overset{1}{8\overline{)8}}$	$\overset{5}{7\overline{)35}}$	$\overset{7}{2\overline{)14}}$	$\overset{6}{8\overline{)48}}$	$\overset{8}{4\overline{)32}}$
6.	$\overset{2}{3\overline{)6}}$	$\overset{7}{1\overline{)7}}$	$\overset{4}{4\overline{)16}}$	$\overset{5}{9\overline{)45}}$	$\overset{8}{5\overline{)40}}$	$\overset{8}{7\overline{)56}}$
7.	$\overset{0}{7\overline{)0}}$	$\overset{1}{6\overline{)6}}$	$\overset{6}{6\overline{)36}}$	$\overset{6}{2\overline{)12}}$	$\overset{2}{9\overline{)18}}$	$\overset{4}{3\overline{)12}}$
8.	$\overset{4}{1\overline{)4}}$	$\overset{0}{3\overline{)0}}$	$\overset{6}{5\overline{)30}}$	$\overset{3}{7\overline{)21}}$	$\overset{9}{4\overline{)36}}$	$\overset{7}{5\overline{)35}}$
9.	$\overset{1}{2\overline{)2}}$	$\overset{8}{1\overline{)8}}$	$\overset{9}{8\overline{)72}}$	$\overset{5}{3\overline{)15}}$	$\overset{9}{9\overline{)81}}$	$\overset{8}{6\overline{)48}}$
10.	$\overset{1}{9\overline{)9}}$	$\overset{0}{8\overline{)0}}$	$\overset{9}{2\overline{)18}}$	$\overset{6}{7\overline{)42}}$	$\overset{7}{3\overline{)21}}$	$\overset{5}{8\overline{)40}}$
11.	$\overset{6}{1\overline{)6}}$	$\overset{1}{4\overline{)4}}$	$\overset{4}{6\overline{)24}}$	$\overset{3}{9\overline{)27}}$	$\overset{4}{5\overline{)20}}$	$\overset{5}{2\overline{)10}}$
12.	$\overset{1}{5\overline{)5}}$	$\overset{2}{1\overline{)2}}$	$\overset{2}{5\overline{)10}}$	$\overset{3}{6\overline{)18}}$	$\overset{3}{4\overline{)12}}$	$\overset{7}{7\overline{)49}}$
13.	$\overset{0}{4\overline{)0}}$	$\overset{2}{2\overline{)4}}$	$\overset{5}{4\overline{)20}}$	$\overset{8}{3\overline{)24}}$	$\overset{7}{8\overline{)56}}$	$\overset{5}{6\overline{)30}}$
14.	$\overset{1}{7\overline{)7}}$	$\overset{0}{1\overline{)0}}$	$\overset{4}{9\overline{)36}}$	$\overset{8}{2\overline{)16}}$	$\overset{2}{7\overline{)14}}$	$\overset{6}{9\overline{)54}}$
15.	$\overset{3}{1\overline{)3}}$	$\overset{0}{2\overline{)0}}$	$\overset{3}{8\overline{)24}}$	$\overset{3}{5\overline{)15}}$	$\overset{6}{4\overline{)24}}$	$\overset{4}{7\overline{)28}}$

To the Teacher. See the footnotes on pages 7 and 13 and page 328.

Note errors or hesitancy on progress cards. Since knowledge of division facts depends on knowledge of multiplication facts, plan for drill on multiplication facts to improve mastery of division facts.

Reteach basic understandings in division.

How to Help Yourself

1. A multiplication fact like $6 \times 7 = 42$ tells you that six 7's make 42. A division fact like $7\overline{)42}$ asks you how many 7's make 42. You cannot answer the question, "How many 7's make 42?" if you do not know that $6 \times 7 = 42$. You see that if you know the multiplication facts well, you should have no trouble with the division facts.

2. If you did not know the answers to all the division facts on page 198, study the multiplication facts on page 196. If there are some multiplication facts you do not know, study them until you do. Then try to give the answers to the division facts on page 198.

3. Most of the division facts can be put in pairs. If you know that $28 \div 4 = 7$, you should also know that $28 \div 7 = 4$.

$12 \div 3 = 4$

4. What fact goes with $12 \div 4 = 3$ to make a pair?
What fact goes with $27 \div 3 = 9$ to make a pair?

$27 \div 9 = 3$

Give the answers to these division facts:

5. $\overset{5}{2\overline{)10}}$ $\overset{9}{8\overline{)72}}$ $\overset{7}{2\overline{)14}}$ $\overset{9}{5\overline{)45}}$ $\overset{6}{4\overline{)24}}$ $\overset{2}{6\overline{)12}}$ $\overset{4}{5\overline{)20}}$

6. $\overset{9}{4\overline{)36}}$ $\overset{7}{3\overline{)21}}$ $\overset{7}{6\overline{)42}}$ $\overset{8}{7\overline{)56}}$ $\overset{2}{9\overline{)18}}$ $\overset{8}{4\overline{)32}}$ $\overset{7}{5\overline{)35}}$

7. For each fact in ex. 5 and 6, give the other fact that makes the pair. Ex. 5: $10 \div 5 = 2$; $72 \div 9 = 8$; $14 \div 7 = 2$; $45 \div 9 = 5$; $24 \div 6 = 4$; $12 \div 2 = 6$; $20 \div 4 = 5$; for ex. 6, see G-69.

8. If you forget the answer to a division fact like $4\overline{)32}$, ask the question, "How many 4's make 32?" If you remember that $8 \times 4 = 32$, you know that $4\overline{)32}$ is 8.

Stress the two ways of discovering division fact: referring to its related multiplication fact, and thinking of its pair. Have pupils give corresponding multiplication facts in ex. 5–6.

See G-69 for correlation of examples with aims.

Chapter Review

1. How many feet are there in 1 mi.? 5280

2. How many yards are there in 1 mi.? 1760

3. There are 9468 people living in Newcastle. In Garden City there are 8975 people. How many more people live in Newcastle than in Garden City? 493

4. Write a 5-place number and tell what it means.

5. Write a 6-place number and tell what it means.

Add and check:

6.	4264	2343	4214	$27.74	$46.77
	3598	7306	1548	6.59	48.67
	4136	1692	1727	54.39	10.98
	11,998	11,341	7489	$88.72	$106.42

Subtract and check:

7.	8376	6800	5440	$77.45	$90.00
	5678	3984	3892	49.56	54.07
	2698	2816	1548	$27.89	$35.93

Divide each number by 8; (1) **divide each by 9:** (2)

(1)	5R2	9R4	4R5	6R5	3R1	8R4	2R3	3R6
8.	42	76	37	53	25	68	19	30
(2)	4R6	8R4	4R1	5R8	2R7	7R5	2R1	3R3

Multiply each number by 8; (1) **multiply each by 9:** (2)

(1)	1896	3248	6552	6016	1304	7560
9.	237	406	819	752	163	945
(2)	2133	3654	7371	6768	1467	8505

Find the quotients and remainders, if any:

	35	99	69	137	555 R5
10.	8)280	8)792	9)621	9)1233	9)5000
	78	57	87R4	544	925
11.	9)702	8)456	8)700	9)4896	8)7400
	92R7	19R3	95	677	419R7
12.	9)835	9)174	8)760	9)6093	8)3359

Note errors or hesitancy on progress cards. Group pupils for remedial work (stress understandings) or drill. Let other pupils work at arithmetic corner.

A Problem Test

1. Joe walked to his uncle's farm. He left home at 8:15 A.M. and arrived at the farm at 9:32 A.M. How long did it take Joe to walk to the farm? 1hr. 17min.

2. Mary took in $2.80 selling 8 tickets for the school flower show. What was the price of 1 ticket? $.35

3. George earned $1.75, $3.25, and $2.85 on 3 Saturdays. How much did George earn all together? $ 7.85

4. Father drove 275 mi. yesterday and 330 mi. today. How much farther did he drive today than yesterday? 55mi.

5. Our class has $25.00 to use for new records. Can we buy 8 records at $2.98 each? Yes Will any money be left? Yes If so, how much? $ 1.16

6. How many 9-cent bus tickets can Andy buy with 50¢? Will he get any change? Yes, 5¢

7. Ann bought 8 yd. of cloth at $.54 a yard. How much did the cloth cost? $ 4.32

8. Ann made 9 aprons from the cloth she bought in ex. 7. Find the cost of the cloth for 1 apron. $.48

9. Bob sold 85 bags of peanuts at $.08 each. How much money did he get for them? $ 6.80

10. Jim looked at two fish poles. One cost $5.95 and the other cost $7.50. What was the difference in their prices? $ 1.55

Count 10 for each problem you have right.

Remind pupils to read problems carefully (see page 190).
Group pupils who had difficulties for analysis of errors.
Have other pupils make up new problems for arithmetic corner.

Provide diagnostic test involving all four processes.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Pages for that row.

Add and check:

					Practice Pages
1.	$\begin{array}{r}9657\\3119\\7881\\1724\\\hline 22{,}381\end{array}$	$\begin{array}{r}3776\\2818\\1235\\7709\\\hline 15{,}538\end{array}$	$\begin{array}{r}3331\\2478\\3858\\1443\\\hline 11{,}110\end{array}$	$\begin{array}{r}1244\\2966\\5467\\1315\\\hline 10{,}992\end{array}$	188

Subtract and check:

2.	$\begin{array}{r}7632\\3897\\\hline 3735\end{array}$	$\begin{array}{r}4108\\2159\\\hline 1949\end{array}$	$\begin{array}{r}9000\\6325\\\hline 2675\end{array}$	$\begin{array}{r}5424\\2477\\\hline 2947\end{array}$	189, 192

Multiply and check:

3.	$\begin{array}{r}342\\8\\\hline 2736\end{array}$	$\begin{array}{r}196\\8\\\hline 1568\end{array}$	$\begin{array}{r}758\\8\\\hline 6064\end{array}$	$\begin{array}{r}209\\8\\\hline 1672\end{array}$	$\begin{array}{r}437\\8\\\hline 3496\end{array}$	170
4.	$\begin{array}{r}214\\9\\\hline 1926\end{array}$	$\begin{array}{r}590\\9\\\hline 5310\end{array}$	$\begin{array}{r}683\\9\\\hline 6147\end{array}$	$\begin{array}{r}724\\9\\\hline 6516\end{array}$	$\begin{array}{r}965\\9\\\hline 8685\end{array}$	170

Divide and check:

5.	$\begin{array}{r}6R7\\8\overline{)55}\end{array}$	$\begin{array}{r}8R5\\8\overline{)69}\end{array}$	$\begin{array}{r}2R1\\8\overline{)17}\end{array}$	$\begin{array}{r}9R3\\8\overline{)75}\end{array}$	176, 177
6.	$\begin{array}{r}4R3\\9\overline{)39}\end{array}$	$\begin{array}{r}7R2\\9\overline{)65}\end{array}$	$\begin{array}{r}5R5\\9\overline{)50}\end{array}$	$\begin{array}{r}3R4\\9\overline{)31}\end{array}$	182
7.	$\begin{array}{r}56\\8\overline{)448}\end{array}$	$\begin{array}{r}74R3\\8\overline{)595}\end{array}$	$\begin{array}{r}193\\8\overline{)1544}\end{array}$	$\begin{array}{r}428\\8\overline{)3424}\end{array}$	178
8.	$\begin{array}{r}82\\9\overline{)738}\end{array}$	$\begin{array}{r}95\\9\overline{)855}\end{array}$	$\begin{array}{r}111R1\\9\overline{)1000}\end{array}$	$\begin{array}{r}437\\9\overline{)3933}\end{array}$	183

Compare results with previous ones as noted on progress cards. Help pupils who did not do well to analyze their errors. Then urge them to make self-assignments from practice pages.

See G-71 for specific aims of Chapter 6.

Chapter 6

First review place value: 5 tens or 5 × 10 are written as 50, 8 tens or 8 × 10 are written as 80, and so on.

Multiplying by 10

1. Bill is counting the pennies he has saved. He has 10 piles with 5 pennies in each pile. How many are ten 5's? 50 How many are 10 × 5? 50

2. How many are 5 × 10? 50 You know that 5 × 10 and 10 × 5 have the same product. So if you know the answer to 5 × 10, you know it for 10 × 5.

3. Find the cost of ten 4-cent stamps. How many are 10 × 4? 40 A quick way to get the answer, 40, is to write a zero after 4.

Be sure pupils understand "why." ↓

To multiply a number by 10, you can write 0 after the number.

Have pupils prove some examples in ex. 5 by addition.

4. There are 24 pencils in a box. How many pencils are there in 10 boxes? 240

40 70 80 460 150

5. Multiply each number by 10: 4, 7, 8, 46, 15,

700 270 840 390 90 60 1000 1930 2000

70, 27, 84, 39, 9, 6, 100, 193, 200. Use vertical form.

After review, use commutative principle: if 5 × 10 = 50, then 10 × 5 = 50, and so on. Do many examples on board and lead pupils to see that when 1-figure number is multiplied by 10, it is pushed over to tens place and zero (place holder) is affixed. Extend to 2-figure numbers.

Multiplying by 20, 30, 40

1. How many are 3 × 20? 60 How many are 20 × 3? 60

2. How many are 4 × 20? 80 How many are 20 × 4? 80

3. How many are 5 × 20? 100 20 × 5? 100

4. How many are 6 × 20? 120 20 × 6? 120

20 × 3 = 60
20 × 4 = 80
20 × 5 = 100
20 × 6 = 120

5. Look at the four multiplications at the right. Can you make a rule that tells you how to get the answer quickly when you multiply a number by 20? Multiply by 2 and add 0.

6. On paper make a table like the one above by multiplying 3, 4, 5, and 6 each in turn by 30. Does the rule you made work this time? Yes, multiply by 3 and add 0.

7. You know that 20 = 2 × 10, and 30 = 3 × 10. To multiply a number by 20, first multiply it by 2 and then write 0 after the product. Tell how to multiply a number by 30; by 40; by 50; by 70.

8. Study these examples. You see that the zero stands out at the right: Develop understanding before letting pupils use this short cut (see G-72).

$$\begin{array}{r}34\\ \underline{20}\\ 680\end{array}\qquad\begin{array}{r}12\\ \underline{40}\\ 480\end{array}\qquad\begin{array}{r}25\\ \underline{30}\\ 750\end{array}\qquad\begin{array}{r}13\\ \underline{80}\\ 1040\end{array}\qquad\begin{array}{r}60\\ \underline{50}\\ 3000\end{array}$$

Multiply. Write the examples as shown in ex. 8: Have pupils explain work.

9. 30 × 26 780 90 × 15 1350 20 × 73 1460 70 × 12 840

10. 70 × 13 910 40 × 60 2400 60 × 32 1920 30 × 50 1500

11. 20 × 45 900 50 × 17 850 80 × 45 3600 90 × 11 990

More Practice. See ㉗ on page 322. Use for further teaching.

Discuss ex. 1-4 with pupils, stressing commutative principle, and proving some by addition. Show ex. 8 on board, with tens and ones aligned. Emphasize place value and that only one multiplication is needed, since zero is place holder in ones place.

Ex. 1 illustrates fact that multiplication is distributive with respect to addition, i.e., 15 × 16 = (10 + 5) (16) = 10 (16) + 5 (16).

Multiplying by a 2-Place Number

1. Problem There are 15 children who want to make story books. Each book will have 16 sheets of paper in it. How many sheets of paper are needed in all? 240

Explanation You must multiply 16 by 15.

Remember that 15 equals 10 + 5. To multiply 16 by 15, you can multiply 16 by 5 and then 16 by 10 and add the products as shown at the right.

$$\begin{array}{rr} & 5 \times 16 = 80 \\ & 10 \times 16 = \underline{160} \\ \text{So} & 15 \times 16 = 240 \end{array}$$

There is a better way to write the work. See A at the right. Multiply 16 by 5, which gives 80. Write 80 so that 0 comes under the 5 ones by which you are multiplying. Next multiply 16 by 1, which gives 16. Write 16 so that 6 comes under the 1 ten by which you are multiplying. The product of 16 and 10 is really 160. Drop the 0 and write only 16, with the 6 in tens place, as shown at A. You could write the 0 of 160 as in B, but it is shorter to drop the 0.

A	B
16	16
15	15
80	80
16	160
240	240

Add the two products as they stand in A, which gives 240. The children need 240 sheets of paper.

Let different pupils explain work in ex. 2-3, using the 3 methods.

Multiply as shown above. Check by going over your work:

2.	18	23	25	19	12	18	32	19
	12	14	23	25	15	35	13	34
	216	322	575	475	180	630	416	646
3.	14	24	21	48	33	11	47	13
	16	24	14	22	32	19	12	17
	224	576	294	1056	1056	209	564	221

More Practice. See ㉘ on page 322.

In ex. 1, emphasize place value of multiplier and reasons for placement of partial products (80 and 160). Have pupils use method B showing breakdown (5 ones × 16, 10 ones × 16), until understanding is assured.

A New Check for Multiplication

1. In A at the right, you see that the product of 7 and 59 has 3 figures. The product of 30 and 59 has 4 figures but 0 is dropped. The answer is 2183.

A	B
59	37
37	59
413	333
177	185
2183	2183

One way to check the work is to go over it again. Another way to check is to change the places of 59 and 37, writing 59 under 37, as shown in B. Then multiply again. The answer for B is also 2183. Since the two answers are the same, you may call the work right.

2. Study each example to see how it is worked:

28	56	52	$.96	$.36
23	13	44	35	82
84	168	208	4 80	72
56	56	208	28 8	28 8
644	728	2288	$33.60	$29.52

You see that you multiply cents the same way you multiply other numbers. You place the decimal point before the last two figures of the answer.

Do not insist that zero be dropped in these examples.

Multiply. Check your work by changing the places of the numbers and multiplying again: Emphasize correct placement of products (place value).

3.	58	90	39	18	84	$.75	$.52
	86	29	53	13	75	34	29
	4988	2610	2067	234	6300	$25.50	$15.08
4.	31	63	87	46	75	$.92	$.46
	27	41	92	62	57	46	38
	837	2583	8004	2852	4275	$42.32	$17.48

More Practice. See ㉙ on page 322. Use to reinforce meanings.

Review commutative principle as applied to basic facts, and 1-figure multipliers (page 101). Then proceed with lesson. Point out that, in money problems, space is left in partial products for decimal point.

Extend multiplication of 2-figure numbers in problems about money.

How Much Money in All?

1. The children are counting the money they got from selling tickets for a pet show. They have 54 quarters. How much money is this? Multiply $.25 by 54 to find the answer. $13.50

2. There are 13 half dollars. What numbers do you multiply to find the answer? 13 x $.50 How much is this? $6.50

3. Do you know another way to do ex. 2? Yes; divide 13 by 2 and change to dollars and cents. Do you get the same answer both ways? Yes Can you do ex. 1 another way and get the same answer you got before? Yes; divide 54 by 4 and change to dollars and cents.

4. There are 77 dimes. How much money is this? $7.70

5. There are 16 nickels in all. How many cents do 16 nickels make? $.80

6. Besides the money in ex. 1–5 there are 45 pennies. Find the amount of money the children counted. $28.95

7. To check their work the children put the coins in piles, with coins worth $1 in each pile. They had 28 piles of $1 each. There were 10 nickels and 45 pennies left. Does this check with ex. 6? Yes

Urge better pupils to think of easy ways to do ex. 2–3. Let less capable pupils use play money to discover answers. Make up other examples similar to ex. 4 to reinforce place-value understandings.

Test basic understandings of measures.

Which Word Is Right?

There are three words in the second line of each exercise. Tell which of these words should be used in the space:

1. Ann says that she is now 10 years . . . old.
days weeks years

2. Ann's brother is 4 inches . . . taller than Ann.
miles inches yards

3. At the store Mother bought 5 pounds . . . of sugar.
pounds gallons miles

4. The movie begins at quarter . . . past 2 today.
eighth quarter sixth

5. Tom sold 11 dozen . . . eggs this week and last.
dozen quarts feet

6. Peggy needs 3 yards . . . of cloth for a coat.
inches feet yards

7. School was closed 10 days . . . at Easter time.
months weeks days

8. Susan had 1 glass . . . of milk for her lunch.
gallon glass dozen

9. Mother paid 25 dollars . . . for her new spring coat.
dollars cents nickels

10. There are 12 hours . . . from 9 A.M. to 9 P.M.
seconds minutes hours

11. March and May each have 31 days . . .
months days weeks

12. Water begins to freeze at 32 degrees . . . above zero.
feet seconds degrees

Note areas of class or individual weaknesses, and group pupils for further review. Let other pupils make up similar exercises, to be completed with terms not used in ex. 1-12.

Extend teaching of Roman numerals to include XXX.

More about Roman Numerals

1. You know the Roman numerals from 1 to 12. Try to write them in order. See page 83 for help.

2. How many different letters are used in the Roman numerals from 1 to 12? Three What are they? I, V, and X You can use these same letters to stand for larger numbers.

3. When you write I **before** the Roman numeral V or X, you subtract 1 from V or X.

   IV = 5 − 1, or 4.   IX = 10 − 1, or 9.

4. When you write I, II, or III **after** V or X, you add 1, 2, or 3 to V or X.

   VII = 5 + 2, or 7.   XIII = 10 + 3, or 13.

5. If you write any of the first ten Roman numerals after X, you add to 10 the number it represents.

   XIV = 10 + 4, or 14   XX = 10 + 10, or 20.

6. If you write any of the first ten Roman numerals after XX, you add to 20 the number it represents.

   XXVI = 20 + 6, or 26   XXIX = 20 + 9, or 29.

7. Follow the rules in ex. 5 and 6 and write these in Roman numerals: 19, 16, 22, 25, 28, 15, 27, 30.

   XIX XVI XXII XXV XXVIII XV XXVII XXX

8. Read these numbers:

   21 27 20 13 16 24 18
   XXI XXVII XX XIII XVI XXIV XVIII
   14 23 15 25 19 17 26
   XIV XXIII XV XXV XIX XVII XXVI

Do page orally with pupils. Then have them make up sentences, using Roman numerals, for partners to translate into Arabic numbers. See other suggestions for page 83.

Teach the solving of two-step problems (pages 210-211).

Two-Step Problems

1. At the store Ann spent 8¢ and 7¢. How much money did Ann spend? 15¢

2. Ann had 25¢ to pay for the things she bought in ex. 1. How much money did Ann have left? 10¢

3. There are two problems above and both of them are about Ann. Here is a way to put the two problems together into one problem: Ann went to the store with 25¢. She spent 8¢ and 7¢. How much money did Ann have left?

4. You see there is only one question in ex. 3 but you have to work two steps to get the answer to this question. What is the question that has been left out? How much did Ann spend all together? Do you need to answer this question in ex. 3 even if the question is not given in the problem? Yes

5. Here are the two steps worked out:

Step 1. You must answer this question: How much did Ann spend? To find out, add 8 and 7, which gives 15. Ann spent 15¢. You now use 15¢ to work the second step.

$$\begin{array}{r} 8 \\ \underline{7} \\ 15 \end{array}$$

Step 2. You are now ready to answer the question: How much money did Ann have left? To find out, subtract 15 from 25, which gives 10. Ann had 10¢ left.

$$\begin{array}{r} 25 \\ \underline{15} \\ 10 \end{array}$$

▶ In Step 1, the question asked is called the **hidden question** because it is **not** given in the problem. You have to ask and answer the hidden question before you work Step 2. In Step 2, the question asked is the one given in the problem. In each two-step problem, first find the hidden question and answer it.

Discuss ex. 1-5 carefully with pupils, emphasizing that they must find hidden question in first step before second step can be answered. Make up similar problems for class to discuss and solve together.

Read each problem. Ask the hidden question for Step 1 before you work the problem: (1)

6. Tom wants 75¢ to buy a book. He had 38¢ and today he earned 25¢. How much more does he need?
(1) How much did he have in all? (63¢); 12¢

7. Susan had saved 63 buttons. Aunt Mary gave her 75 buttons. Then Susan gave Ann 50 buttons. How many buttons has Susan left? (1) How many did she have all together? (138); 88

8. Jack spent $.48 out of a dollar. He put the rest in his bank with $6.87 he already had there. Now how much has Jack in his bank? (1) How much of the dollar was left? ($.52); $7.39

9. Betty had $8.89 and earned $1.75 more. Sally had $12.20 in all. How much more had Sally than Betty?
(1) How much did Betty have in all? ($10.64); $1.56

10. Bill had 235 stamps. Then he bought 2 packages of stamps with 75 stamps in each package. How many stamps has Bill all together? (1) How many stamps in all did he buy? (150); 385

▶ What do you do to answer the hidden question? Multiply

11. Mother bought 3 yd. of cloth at $.89 a yard and ribbon for $.49. How much did Mother spend?
(1) How much did the cloth cost? ($2.67); $3.16

12. Andy and Peter earned $5.00 together. They shared the money equally. Andy spent $.85 of his share. How much money did Andy have left? (1) What was each boy's share? ($2.50); $1.65

13. At the bakery Jane bought $\frac{1}{2}$ doz. rolls at 40¢ a dozen and a cake for 65¢. How much did Jane spend in all at the bakery? (1) How much did the rolls cost? (20¢); 85¢

14. Ben bought 2 movie tickets at 35¢ each. He paid 15¢ for popcorn too. How much did Ben spend? (1) How much did the tickets cost? (70¢); 85¢

Let pupils who have grasped this skill work independently. Group others and do ex. 6–14 with them, giving help as needed.

Review skills in all four fundamental operations.

Keeping in Practice

Divide. Check the work by multiplying:

1. $\begin{array}{r}46\text{R}3\\8\overline{)371}\end{array}$ $\begin{array}{r}234\\4\overline{)936}\end{array}$ $\begin{array}{r}75\\6\overline{)450}\end{array}$ $\begin{array}{r}147\text{R}2\\9\overline{)1325}\end{array}$ $\begin{array}{r}856\\3\overline{)2568}\end{array}$

2. $\begin{array}{r}98\\7\overline{)686}\end{array}$ $\begin{array}{r}175\\5\overline{)875}\end{array}$ $\begin{array}{r}478\text{R}1\\2\overline{)957}\end{array}$ $\begin{array}{r}593\\8\overline{)4744}\end{array}$ $\begin{array}{r}849\\6\overline{)5094}\end{array}$

3. $\begin{array}{r}289\\3\overline{)867}\end{array}$ $\begin{array}{r}79\text{R}6\\9\overline{)717}\end{array}$ $\begin{array}{r}137\\7\overline{)959}\end{array}$ $\begin{array}{r}362\\6\overline{)2172}\end{array}$ $\begin{array}{r}973\text{R}2\\4\overline{)3894}\end{array}$

Copy in columns, add, and check:

4. 43, 13, 85, 26, 52 219 35, 66, 38, 50, 49 238
5. 12, 36, 77, 85, 19 229 27, 96, 47, 84, 48 302
6. 32, 46, 67, 98, 24 267 25, 42, 55, 42, 56 220
7. 37, 45, 87, 16, 31 216 42, 76, 23, 67, 38 246
8. 45, 25, 13, 79, 95 257 28, 56, 86, 87, 19 276

9. Find the cost of 28 books at $.75 each. $ 21.00

10. Find the cost of 60 rulers at $.15 each. $ 9.00

11. Find the cost of 15 lunches at $.25 each. $ 3.75

12. Find the cost of 12 cakes at $.55 each. $ 6.60

Subtract and check:

13. $\begin{array}{r}7692\\\underline{4773}\\2919\end{array}$ $\begin{array}{r}9344\\\underline{3658}\\5686\end{array}$ $\begin{array}{r}6507\\\underline{6348}\\159\end{array}$ $\begin{array}{r}\$41.00\\\underline{31.84}\\\$\ 9.16\end{array}$ $\begin{array}{r}\$74.12\\\underline{26.79}\\\$47.33\end{array}$

14. $\begin{array}{r}4114\\\underline{1526}\\2588\end{array}$ $\begin{array}{r}8792\\\underline{7945}\\847\end{array}$ $\begin{array}{r}9000\\\underline{8059}\\941\end{array}$ $\begin{array}{r}\$60.60\\\underline{17.68}\\\$42.92\end{array}$ $\begin{array}{r}\$56.88\\\underline{17.39}\\\$39.49\end{array}$

15. Add the numbers in ex. 13 and 14. Ex. 13: 12,465; 13,002; 12,855; $72.84; $100.91; ex. 14: 5640; 16,737; 17,059; $78.28; $74.27

More Practice. See ㉛ on page 323. Use for reteaching, if necessary.

Observe pupils as they work to note hesitancy and errors. After checking papers, group pupils who had mistakes (or who showed great hesitancy) for remedial work. Help them to analyze their errors.

Review commutative principle as applied to large numbers in multiplication. Develop awareness of need for labeling answers.

Selling Fruits and Vegetables

1. **Problem** The children have 125 bunches of carrots to sell at 9¢ each. How much money will they get? $11.25

Explanation You multiply 9¢ by 125. You can write 125 under 9, as shown at A; but it is easier to multiply by the smaller number. So write 9 under 125 and multiply as shown at B. Remember that 1125 means 1125¢, or $11.25.

$$\begin{array}{r} \text{A} \\ 9 \\ \underline{125} \\ 45 \\ 18 \\ \underline{9} \\ 1125 \end{array} \qquad \begin{array}{r} \text{B} \\ 125 \\ \underline{9} \\ 1125 \end{array}$$

2. The children put 6 carrots in each bunch. How many carrots did they put in 125 bunches? 750

3. The boys have sold 175 apples at 4¢ each. How much money did they get for the apples? $7.00

Find the cost. Multiply the easy way as in ex. 1:

4. 250 stamps at 3¢ each $7.50

5. 135 marbles at 2¢ each $2.70

6. 144 pencils at 5¢ each $7.20

7. 132 plants at 7¢ each $9.24

8. 475 balloons at 9¢ each $42.75

9. 150 oranges at 6¢ each $9.00

Emphasize.

When you multiply the easy way, always tell whether the answer stands for dollars, cents, pounds, or something else.

Do ex. 1 orally with pupils. Let them do ex. 2–3 independently, and ask volunteers for answers. Introduce need for labeling them. Insist that all answers to future word problems be labeled.

Present two-step problems dealing with trip to grocery store.

Shopping at the Supermarket

1. Mary went to shop at the supermarket. She bought $\frac{1}{2}$ pound of beans at \$.18 a pound, apples for \$.25, bananas for \$.20, and oranges for \$.39. How much in all did these things cost? \$.93

▸ This is a two-step problem. The hidden question must be found and answered for the first step. What is this hidden question? How much did the beans cost? The second step answers the question asked in the problem. What do you do to answer this question? Add

2. In the market Andy bought 6 apples at \$.05 each and a bunch of carrots for \$.15. How much did Andy spend all together? \$.45

3. Peter bought 3 pounds of meat at \$.59 a pound. How much change did Peter get from \$5.00? \$3.23

4. Betty went to the store with \$1.00. When she came home she had \$.24 left. She had spent the rest for 4 cans of milk. What was the cost of 1 can? \$.19

Discuss problems orally with pupils. Let different ones tell what the hidden question is in each problem. Then have class solve problem. Remind them that second step answers question in the problem.

5. Ann bought $\frac{1}{2}$ doz. eggs at $.60 a dozen. Then she had $.20 left. How much money did she have before buying the eggs? $.50

6. Three boys bought things for a lunch. They spent $.22 for milk, $.15 for fruit, $.25 for peanut butter, and $.19 for crackers. They shared the cost equally. How much did each boy pay? $.27

7. Susan and her mother went to the market to buy food for the week. They spent $6.54 for meat, $3.75 for fruits and vegetables, and $5.66 for other things. How much change did they get from $20.00? $4.05

8. Four girls bought 12 cupcakes at $.07 each. They shared the cost equally. What did each girl pay? $.21

9. Jack bought fruit for the school picnic. Bananas were $.06 each and apples $.05 each. Jack bought 1 apple and 1 banana for each of the 30 children. How much did the fruit cost? $3.30

10. Sally had $3.00. On the way to the market she paid a bill of $1.86. At the market she spent the rest for 3 boxes of cookies, all the same kind. What was the cost of 1 box of cookies? $.38

Group pupils who still have difficulties for further work with you. Let others make up own two-step problems for arithmetic quiz program, or scrapbooks.

Provide further experience with two-step problems.

Making Things

1. Last year Bill made 6 bird houses and sold them all for $1.00 each. He paid $3.60 for wood and other things. How much money did Bill make on these bird houses? $ 2.40

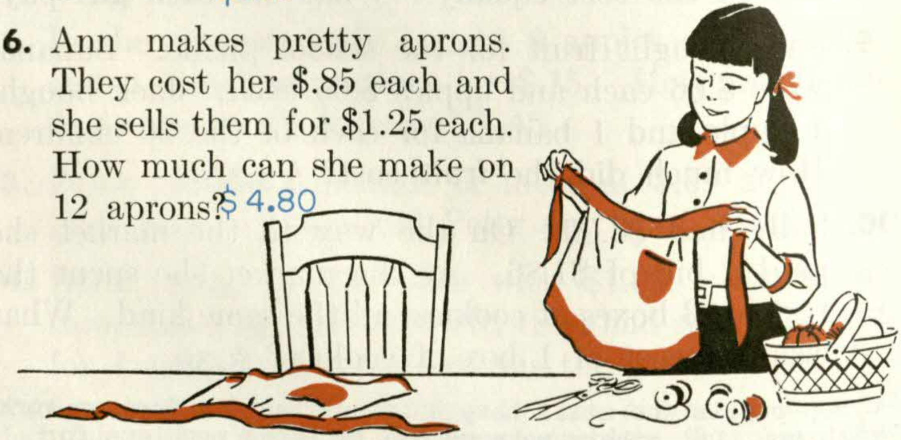
2. In ex. 1, it cost $3.60 to make 6 bird houses. Bill says it costs him $1.05 to make a large bird house. How much more does it cost Bill to make a large bird house than a small one? $.45

3. Bill sells a large bird house for $1.50 and it costs him $1.05 to make one. How much will he make on 8 large bird houses? $ 3.60

4. Betty paints birthday cards to sell. She has made 8 dozen cards and has sold all of them at $.08 each. How much money has Betty taken in so far? $ 7.68

5. Tom made 6 tie holders to give away. The cost of the wood, hooks, and paint was $3.90. In the stores a tie holder like Tom's sells for $1.00. How much does Tom save on each tie holder by making it himself? $.35

6. Ann makes pretty aprons. They cost her $.85 each and she sells them for $1.25 each. How much can she make on 12 aprons? $ 4.80



See suggestions for pages 210-211, 214-215.

Oral Review

1. Count by 2's to 45, beginning with 1. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45

2. Count by 3's to 44, beginning with 2. 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44

3. Count by 5's to 48, beginning with 3. 3, 8, 13, 18, 23, 28, 33, 38, 43, 48

4. How many inches are there in 1 yd.? 36

5. Divide each number by 9:

63 7 27 3 45 5 81 9 54 6 72 8 10 1R1 4 0R4

6. Multiply each number by 10;(1) by 20:(2)

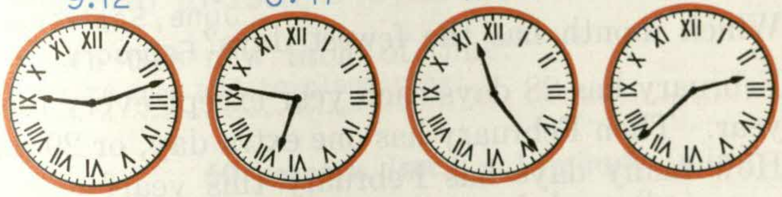
(1) 80 90 110 600 230 420 140 310

(2) 8 160 9 180 11 220 60 1200 23 460 42 840 14 280 31 620

7. Which is less, $\frac{1}{2}$ of a yard or $\frac{1}{3}$ of a yard? $\frac{1}{3}$

8. Tell the time by each of these clocks:

9:12 6:47 11:24 2:38



9. Read these Roman numerals:

XX 20 XVI 16 XXIII 23 XV 15 XIX 19 XXVII 27 XIV 14

10. Name the fewest coins that make (1) 3 pennies, 1 nickel, 1 dime; (2) 1 dime, 1 quarter, 1 half dollar; (3) 2 pennies, 1 nickel, 1 half dollar; (4) 1 nickel, 1 dime, 1 half dollar; (5) 1 nickel, 1 dime, 1 quarter, 1 half dollar; (6) 1 dime, 1 quarter; (7) 1 penny, 1 nickel, 1 dime, 1 quarter

18¢ (1) 85¢ (2) 57¢ (3) 65¢ (4) 90¢ (5) 35¢ (6) 41¢ (7)

11. Subtract 22 from each number:

68 46 45 23 73 51 89 67 94 72 67 45 30 8 50 28

Tell the answers:

12. (8 × 5) + 6 46 3 + (6 × 9) 57 (4 × 8) + 2 34

13. (9 × 3) + 8 35 4 + (5 × 6) 34 (8 × 2) + 7 23

14. (7 × 5) + 5 40 8 + (9 × 7) 71 (7 × 8) + 5 61

Insist that pupils do all work mentally. Let different pupils act as the teacher, calling on others for answers in ex. 12–14. Let them make up similar activities for class contest.

Reteach number of days in each month.

The Calendar

Try to answer ex. 1–4 without a calendar:

1. Name the months of the year in order. January, February,
March, April, May, June, July, August, September, October, November,

2. Write the months of the year with the right spelling. December

3. Tell the date of Christmas. December 25, Does Christmas come on the same day of the month each year? Yes

4. In what month does Thanksgiving come? November, Does it come on the same day of the month each year? No

Look at a calendar to answer ex. 5–8:

5. There are 7 months that have 31 days. Name them. January, March, May, July, August, October, December

6. There are 4 months that have 30 days. Name them. April, June, September, November

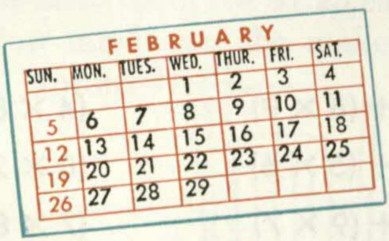
7. Which month has the fewest days? February

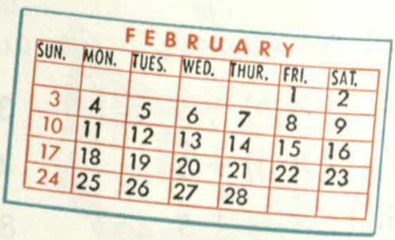
8. February has 28 days each year except every fourth year. Then February has one extra day, or 29 days. How many days has February this year?

9. Learn this:

Thirty days have September,
April, June, and November.

The two lines above will help you to learn the names of the months that have 31 days. Remember that February has either 28 or 29 days.





Teach pupils the rhyme in ex. 9 or knuckle rule (see G–76, 77) as ways of remembering number of days in a month.

Teach meaning of "leap year."

The Calendar

1. A year when February has 29 days is called a **leap year**. The years 1956 and 1960 were leap years. If you divide each of these years by 4, you see that there is no remainder.

2. You can tell whether any year is a leap year without looking at the calendar by dividing it by 4. If there is no remainder, the year is a leap year. If there is a remainder, the year is not a leap year. You can use this rule for all years except those that end with two zeros, as 1900. Tell which of these years were leap years: 1872, 1904, 1927, 1944, 1959. 1872 1904 1944

3. Begin with the year 1948 and give the other leap years up to 1968. 1948, 1952, 1956, 1960, 1964, 1968

4. Learn this new table of time:

Emphasize and add to class chart.

60 seconds (sec.) = 1 minute (min.)
60 minutes (min.) = 1 hour (hr.)
24 hours (hr.) = 1 day (da.)
7 days (da.) = 1 week (wk.)
About 52 weeks (wk.) = 1 year (yr.)
365 days (da.) = 1 year (yr.)
12 months (mo.) = 1 year (yr.)
366 days (da.) = 1 leap year

5. Here are the abbreviations for the names of 9 mo. The 3 shortest names do not have abbreviations. Study these abbreviations and try to write them:

Jan., Feb., Mar., Apr., Aug., Sept., Oct., Nov., Dec.

See G-77 for discussion of reason for leap years, and G-110 for pertinent filmstrips. Have brighter pupils do further investigation on leap years. Use new table and abbreviations in quiz program activity.

Extend pupils' experiences with two-step problems.

Review Problems

1. How much did Ann pay for $\frac{1}{2}$ pound of nuts at \$.90 a pound and a cake at \$.65? $1.10

2. John saves $\frac{1}{4}$ of all the money he earns. How much does John save when he earns \$3.00? $.75 when he earns \$7.00? $1.75 when he earns \$.60? $.15

3. Mary bought a basket of berries for \$.45 and 2 boxes of crackers at \$.26 each. How much in all did Mary spend for these things? $.97

4. Father gave the man a 5-dollar bill to pay for 3 circus tickets at \$1.35 each. How much change did the man give Father? $.95

5. At the fair Andy sold 375 bags of popcorn at \$.10 a bag. How much money did Andy take in? $37.50

6. After Peggy had been on a picnic she had only \$.35 left from \$2.00. How much had she spent? $1.65

7. Peter had 50 marbles. He bought 25 more and then he lost 6 of them. How many marbles were left? 69

8. Mr. Hill drives the school bus 38 mi. each school day. How many miles does he drive the bus in 5 da.? 190 in 10 da.? 380 in 20 da.? 760 in 23 da.? 874

9. Mother bought 10 yd. of cloth at \$.75 a yard and $8.39 buttons for \$.89. How much did these things cost?

10. In a game Bill made 185 points and Tom made 148 points. What was the difference in their scores? 37 points

11. Susan practiced 25 min., 30 min., 45 min., 35 min., and 35 min. on 5 different days. How many minutes did she practice? 170 Is this nearer 2 hr. or 3 hr.? 3 hr.

Let pupils do these examples independently. Remind them to look for, and answer, hidden questions first. Stress labeling of answers. Check papers and group those who need more help. Let others work at arithmetic corner.

Teach division of money numbers by money numbers.

How Many Children Have Paid?

1. At each meeting of the Bird Club the children pay 5¢ apiece. Bob takes in the money. Today he got $1.00. How many paid 5¢ each? 20 children

▶ You know how to divide 20¢ by 5¢. The answer is 4. To divide $1.00 by 5¢, you first change $1.00 to 100¢. Then divide 100 by 5. How many children each paid 5¢? 20

2. Last week Bob got $1.35 from the children. How many paid $.05 each for the Bird Club last week? 27 children

▶ Change $1.35 to 135¢ and $.05 to 5¢. Then divide.

3. Bird pictures are 8¢ each. Bob sent away $2.00 for bird pictures for some children in the Bird Club. How many pictures did he get? 25

Change dollars to cents and divide:

4. $4.50 ÷ 5¢ 90 $1.75 ÷ 2¢ 87R1¢ $34.86 ÷ $.07 498
5. $5.88 ÷ 6¢ 98 $6.00 ÷ 8¢ 75 $11.32 ÷ $.04 283
6. $2.60 ÷ 4¢ 65 $3.50 ÷ 7¢ 50 $18.85 ÷ $.06 314R1¢
7. $8.73 ÷ 9¢ 97 $4.32 ÷ 6¢ 72 $13.32 ÷ $.09 148
8. $9.59 ÷ 7¢ 137 $3.84 ÷ 8¢ 48 $11.90 ÷ $.05 238
9. $7.30 ÷ 5¢ 146 $5.00 ÷ 9¢ 55R5¢ $11.15 ÷ $.08 139R3¢
10. $5.00 ÷ 8¢ 62R4¢ $1.87 ÷ 7¢ 26R5¢ $10.15 ÷ $.07 145
11. $2.00 ÷ 3¢ 66R2¢ $5.58 ÷ 9¢ 62 $11.37 ÷ $.03 379

In doing these examples have pupils follow direction: "change the dividend and divisor to cents and divide as usual." Some pupils may need individual help in changing dollars to cents.

Provide written review of multiplication and division.

Review Practice

Find the products. Check the work: Stress.

1. 9 × 163 1467   6 × 274 1644   32 × 94 3008   49 × 67 3283

2. 5 × 327 1635   7 × 219 1533   17 × 86 1462   61 × 91 5551

3. 8 × 690 5520   4 × 308 1232   56 × 56 3136   42 × 41 1722

4. 3 × 562 1686   9 × 459 4131   26 × 38 988   75 × 84 6300

5. 7 × 347 2429   8 × 175 1400   14 × 59 826   38 × 83 3154

6. Find the number of eggs in 75 doz. eggs. 900

Find the quotients. Check the work: Stress.

7. 736 ÷ 4 184   118 ÷ 2 59   304 ÷ 8 38   840 ÷ 9 93 R3

8. 415 ÷ 5 83   514 ÷ 3 171 R1   972 ÷ 6 162   476 ÷ 7 68

9. 912 ÷ 8 114   807 ÷ 6 134 R3   505 ÷ 9 56 R1   567 ÷ 3 189

10. 680 ÷ 7 97 R1   423 ÷ 9 47   384 ÷ 4 96   632 ÷ 8 79

11. 975 ÷ 3 325   481 ÷ 5 96 R1   875 ÷ 7 125   510 ÷ 6 85

12. How many yards are there in 2640 ft.? 880

Find the answers. Watch the signs: Stress.

13. 46 + 83 129   648 ÷ 9 72   9 × 207 1863   90 − 35 55

14. 70 − 24 46   257 × 4 1028   250 ÷ 7 35 R5   74 + 38 112

15. 12 × 18 216   300 − 9 291   81 − 56 25   300 ÷ 4 75

16. 258 ÷ 6 43   438 ÷ 5 87 R3   19 + 85 104   46 × 75 3450

17. 75 − 42 33   63 + 37 100   523 ÷ 8 65 R3   99 + 46 145

18. 98 + 89 187   37 × 94 3478   198 × 7 1386   52 − 13 39

More Practice. See ㉚ on page 322. Use to reinforce skills.

Help pupils who made mistakes to determine causes of difficulties by having them do computations aloud. Use material found on pages related to pupils' difficulty for reteaching if needed.

Tell whether you add, subtract, multiply, or divide to work each problem. If there are two steps, tell what you do in each step:

1. Jack knows the cost of each of three different things. He knows how much money he gave the man. How can he find how much change he should get?
   ▶ What do you do to answer the hidden question? Add
   What do you do to answer the given question? Subtract
2. Ann knows the cost of one stamp. How can she find the cost of several stamps of the same kind? Multiply
3. Father knows the whole distance he has to drive today. He knows how many miles he has gone so far. How can he find how many more miles he needs to drive?
4. Mother knows how many sugar cookies she baked yesterday. She knows how many are left today. How can she find how many cookies are gone? Subtract
5. Andy knows the cost of a tent and how many boys will share the cost of it. He knows he has enough money for his share. How can he find how much he will have left? Divide ; subtract
6. Susan knows how many buttons come on one card. How can she find how many buttons there are on several cards of this kind? Multiply
7. Betty knows the cost of her new hat, coat, and dress. How can she find how much all of these things cost? Add

Do these problems orally with pupils (better students will probably do most of this work). Then let other pupils suggest numbers to provide real answers. Have class then solve problems.

Review specialized vocabulary words.

What Do the Words Mean?

$$\begin{array}{r} 453 \\ \underline{82} \\ 906 \\ \underline{3624} \\ 37146 \end{array} \qquad \begin{array}{r} 257 \\ 316 \\ 204 \\ \underline{198} \\ 975 \end{array} \qquad \begin{array}{r} 500 \\ \underline{463} \\ 37 \end{array} \qquad \begin{array}{r} 87 \\ 5\overline{)435} \\ \underline{40} \\ 35 \\ \underline{35} \end{array}$$

In the examples above, find the numbers that go with the underlined words in ex. 1–5:

1. The number that is called the quotient is . . . 87.

2. The difference between two numbers is . . . 37.

3. The two five-place numbers are 37,146 . . . and 36,24(0) . . .

4. The number that is called the product is . . . 37,146.

5. The sum of several numbers is . . . 975.

More Multiplication

Teach multiplication of money numbers by 10, 20, and so on.

6. Problem Mr. Brown makes \$9.25 on one kind of radio that he sells. How much does he make if he sells 40 of these radios? \$370.00

Explanation Multiply \$9.25 by 40 and write it as shown here. Remember to put a decimal point before the last two figures at the right. Stress.

$$\begin{array}{r} \$9.25 \\ \underline{40} \\ \$370.00 \end{array}$$

Multiply. Check your work by going over it:

7. 60 × \$1.25 \$75.00 80 × \$3.46 \$276.80 20 × \$7.50 \$150.00

8. 90 × \$6.02 \$541.80 50 × \$4.25 \$212.50 70 × \$5.47 \$382.90

9. 40 × \$4.13 \$165.20 10 × \$5.98 \$59.80 30 × \$4.58 \$137.40

Extend review in ex. 1–5, using the same examples, to include other terms, such as dividend, 3-place number, and so on. In ex. 6, redo multiplication with numbers aligned (see G–72). Let slower pupils use this form.

Multiplying Larger Numbers

1. Problem George's grandfather grows oranges. He puts 288 small oranges in a box. How many oranges are used for 35 boxes of small oranges? 10,080

Explanation Write the work as shown at the right. Multiply 288 by 5, writing the first figure under the 5 by which you multiply. Then multiply 288 by 3, writing the first figure under the 3 by which you multiply. Add the two products. The answer is 10,080. This means 35 boxes hold 10,080 oranges.

```
  288
   35
 1440
 864
10080
```

Multiply as in ex. 1. Check by going over your work:

2.	296	650	486	740	$2.15	$3.62
	43	24	69	31	56	87
	12,728	15,600	33,534	22,940	$120.40	$314.94
3.	319	943	784	487	$1.85	$8.50
	21	57	25	98	73	85
	6699	53,751	19,600	47,726	$135.05	$722.50
4.	491	179	319	427	$5.38	$2.35
	92	89	48	64	36	91
	45,172	15,931	15,312	27,328	$193.68	$213.85

Multiply each number by 35;(1) by 47;(2) by 92;(3) by 68:(4)*

(1), (2) 5915;7943 17,115;22,983 7315;9823 31,325;42,065 26,110;35,062 12,950;17,390
(3) **5.** 169 15,548 489 44,988 209 19,228 895 82,340 746 68,632 370 34,040
18,620;25,004 21,595;28,999 12,740;17,108 7945;10,669 16,030;21,526 22,085;29,657
6. 532 48,944 617 56,764 364 33,488 227 20,884 458 42,136 631 58,052
26,390;35,438 32,725;43,945 6545;8789 22,330;29,986 17,920;24,064 7140;9588
7. 754 69,368 935 86,020 187 17,204 638 58,696 512 47,104 204 18,768

*(4) Ex.5: 11,492; 33,252; 14,212; 60,860; 50,728; 25,160; ex.6: 36,176; 41,956; 24,752; 15,436; 31,144; 42,908; ex.7: 51,272; 63,580; 12,716; 43,384; 34,816; 13,872

More Practice. See ㉜ on page 323.

In ex. 1 explanation, stress reasons for placement of partial products (place value). Urge use of comma in final products, and check placement of decimal points.

Show how to estimate answers to word problems and examples. Develop ability to use skill as check on reasonableness of calculated answer.

Estimating Answers

1. Mary wants a coat that costs $14.98 and a hat that costs $2.95. She is trying to add these numbers mentally to see if she has enough money. She thinks, "$14.98 is about $15 and $2.95 is about $3. $15 and $3 make $18. I have $20, so I can buy the coat and hat." You see that $18 is not the exact answer but it is **close** to it. The exact answer is $17.93, which is **about** $18. When you find an answer the way Mary did, you **estimate** the answer.

2. Estimate the change from $5 after you spend $1.97.$3.00 What number do you think of that is about $1.97?$2.00

3. Bird seed costs 19¢ a box. How much will Bob pay for 6 boxes?$1.20 for 9 boxes? $1.80

▶ 19 is about how many tens?2 The tens numbers are easy to use when you estimate answers. How many are 6 × 20?120 9 × 20?180

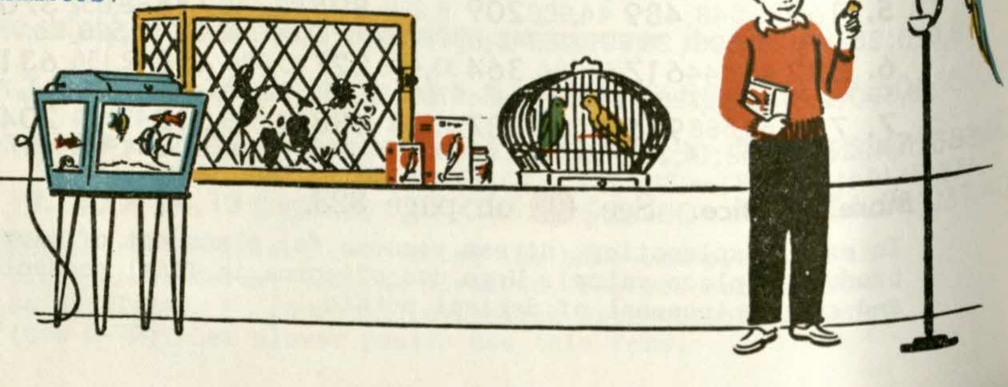
4. Estimate the cost of 7 books at $1.98 each;$14 of 3 books at $3.95 each;$12 of 4 books at $.79 each.$3.20

5. How many tickets at $1.98 each can Father buy for $6?3 for $10?5 for $14?7

6. Estimate the sum of these numbers: 395, 107, 402.900

7. Estimate the difference between 91 and 38.50

Put other numbers on board ($.98, 39, 203, and so on) and have pupils give the corresponding nearest numbers.



Explain that pencil and paper are not needed in estimation, since the numbers are easy to use.

Suppose you have no paper and pencil. Estimate the answers to ex. 8–20. Then find the exact answers, using pencil and paper.

Estimated, $8.00; exact, $7.80

8. Tickets to the circus cost $1.95 each. How much must Father pay for 4 tickets? Is your estimate more than or less than the exact answer? More Can you tell why it is more or less? Because $2.00 is more than $1.95.

Multiply these numbers: (In ex. 9-20, estimate is given first, then exact answer.)

9. 8 × 69 560,552 4 × 29 120,116 2 × 89 180,178 11 × 19 200,209
10. 3 × 88 270,264 6 × 51 300,306 9 × 49 450,441 49 × 50 2500,2450
11. 5 × 49 250,245 8 × 48 400,384 7 × 98 700,686 19 × 41 800,779

12. At the store Tom spent $1.99, $1.97, and $3.95. How much money did Tom spend all together? $8.00, $7.91

Add these numbers:

13. 396 + 602 + 197 1200,1195 397 + 604 + 102 1100,1103
14. 301 + 404 + 202 900,907 503 + 196 + 298 1000,997

15. In ex. 12, Tom spent exactly $7.91. How much change did he get from $10.00? $2.00, $2.09

Subtract these numbers:

16. 398 − 102 300, 296 602 − 498 100, 104 700 − 395 300, 305 800 − 203 600, 597
17. 299 − 187 100, 112 799 − 403 400, 396 900 − 198 700, 702 400 − 296 100, 104

18. How many 9-cent balloons can you buy for 93¢? 10

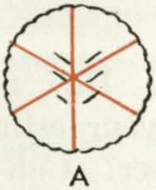
Divide these numbers:

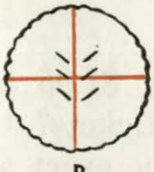
19. $3.98 ÷ 4 $1.00, $.99 R2¢ 199 ÷ 4 50,49 R3 149 ÷ 5 30,29 R4 159 ÷ 8 20,19 R7
20. $3.62 ÷ 6 $.60, $.60 R2¢ 702 ÷ 7 100,100 R2 898 ÷ 3 300,299 R1 597 ÷ 2 300,298 R1

Emphasize that estimation is "mental" process used prior to written work. Point out that numbers are rounded off to nearest ten, hundred, thousand. See G-80 for further discussion.

Reteach relative size of fractions. Demonstrate that the larger the denominator of a unit fraction, the smaller the fraction.

More about Fractions


A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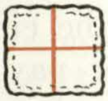
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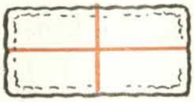

D

1. At A and B you see 2 pies exactly the same size. Each pie is cut into equal pieces. What part of pie A is one piece?$\frac{1}{6}$ What part of pie B is one piece?$\frac{1}{4}$ Is a piece of pie A larger or smaller than a piece of pie B? Smaller Is $\frac{1}{6}$ larger or smaller than $\frac{1}{4}$? Smaller

2. Suppose the boys ate 3 pieces of pie A. What part of pie A did they eat?$\frac{1}{2}$ What other fraction shows the part of pie A they ate?$\frac{3}{6}$ This shows that $\frac{3}{6}$ = .$\frac{1}{2}$..

3. Suppose the girls ate 2 pieces of pie B. What part of pie B did they eat?$\frac{1}{2}$ Write another fraction that shows the part of pie B they ate.$\frac{2}{4}$ So $\frac{2}{4}$ = .$\frac{1}{2}$..

***4.** What part of cake C is 1 piece of cake C?$\frac{1}{4}$ What part of cake D is one piece of cake D?$\frac{1}{4}$ Does $\frac{1}{4}$ of cake C equal $\frac{1}{4}$ of cake D? No Give a reason for your answer. Pieces in cake D are bigger than those in cake C.

5. Draw a circle and divide it into 4 equal parts. Color $\frac{1}{4}$ of your circle. What part is not colored?$\frac{3}{4}$

*Use other examples to show that size of fraction also depends on size of object.

Tell the missing numbers:

6. 1 whole pie equals .8. eighths of the pie.

7. 1 whole pie equals .6. sixths of the pie.

8. 1 whole pie equals .4. fourths of the pie.

9. 1 whole pie equals .2. halves of the pie.

Use flannelboard and fractional parts in discussing these examples with pupils. Let them use paper circles or squares to see that as the object is divided into smaller and smaller parts, the denominator becomes larger.

Present two rapid review tests.

Mixed Review

Copy the exercises and follow the signs:

1.	134	2437	2420	780	613
	×76	+1926	−1976	×9	×42
	10,184	4363	444	7020	25,746

	624 R2	183	937	
2.	7)4370	9)1647	6)5622	$\frac{1}{8}$ of 4776 597

3.	5000	265	8079	89	407
	−4046	×7	+8929	×53	×18
	954	1855	17,008	4717	7326

4. 347 + 206 + 197 + 514 1264 275 + 428 + 630 + 139 1472

5. 398 × 6¢ $23.88 250 × 8¢ $20.00 $3.00 ÷ $.04 75

6. 800 − 53 747 349 × 75 26,175 $4.34 ÷ $.07 62

More **Practice.** See ㉝ on page 324.

Review Test

Copy the exercises and follow the signs:

7.	$50.00	**8.**	437	**9.**	$.84
	−29.83		×8		×46
	$20.17		3496		$38.64

10. $\frac{1}{5}$ of $7.25 $1.45 **11.** 8)$37.05 $4.63 R1¢ **12.** 403 − 298 105

13. $40.00 ÷ 7 $5.71 R3¢ **14.** 39 × 215 8385

15. 47 + 93 + 28 + 59 227 **16.** 82 + 76 + 34 + 56 248

In this test each example counts 10. Go over your work and check each example.

Give ex. 7-16 first. Those who do well may omit ex. 1-6 and work at arithmetic corner. Give other pupils the new test (ex. 1-6) and note further errors. Use "More Practice" for individual pupil assistance.

Provide further practice in solving two-step problems.

Two-Step Problems

1. Sally had \$.75 in her pocket. She spent \$.09 to ride on a bus and \$.35 to go to a movie. How much money did she have left? \$.31

2. Jack paid \$1.25 for a fish bowl and \$.25 each for 6 little fish. How much did Jack spend all together? \$2.75

3. Tom has saved 25 box tops. He wants to get a game for 15 box tops and a fish pole for 33 box tops. How many more box tops does Tom need? 23

4. Three sisters spent \$4.95 for a yellow bird, \$3.79 for a cage, and \$1.10 for bird food and other things. If they shared equally the cost of everything, how much did each girl pay? \$3.28

5. Jim needs 3 pt. of paint. It costs \$.45 a pint and \$.75 a quart. How much can Jim save by getting a quart can and a pint can instead of 3 pint cans? \$.15

6. Susan had \$.18. She earned \$.45 today. She wants to spend her money for 7-cent cards. How many cards can Susan buy? 9

7. The boys sold 35 tickets for a pet show and the girls sold 39. The price of each ticket was \$.25. How much money did the children take in all together? \$18.50

8. The children made \$13.50 from the pet show. They bought 3 new records at \$3.98 each. How much money did they have left? \$1.56

Remind pupils to answer the hidden question first. Stress importance of estimating answers as check of reasonableness of calculated answers. In discussing answers, have pupils give estimated answer first.

Making Change

1. Andy bought $\frac{1}{2}$ pound of candy at \$.92 a pound. How much change did he get from a half dollar? \$.04

2. Peggy shopped for her mother. She spent \$.53, \$.29, and \$.56. What was her change from \$2.00? \$.62

3. Tell three different ways to make the change in ex. 2. Count the change as the man might do.

4. Count the change from \$1.00 for things that cost:
53,55,65,75,\$1.00 81,85,90,\$1.00 15,25,50,\$1.00 36,40,50,\$1.00
53¢ 19¢ 81¢ 28¢ 15¢ 27¢ 36¢
19,20,25,50,\$1.00 28,30,40,50,\$1.00 27,30,40,50,\$1.00

5. George bought 4 cans of corn at \$.15 a can. He gave the man \$1.00. The change he got was 7 nickels. \$.35 Was this right? No How would you make the change? 1 nickel, 1 dime, 1 quarter

Study ex. 6–12 and tell whether or not the change is right:

	Money Given	Money Spent	Change
6.	\$1.00	\$ .30	7 dimes Yes
7.	\$5.00	\$1.50	4 dollars No
8.	\$2.00	\$1.40	6 dimes Yes
9.	\$3.00	\$2.50	2 half dollars No
10.	\$5.00	\$4.60	8 nickels Yes
11.	\$2.00	\$1.30	3 quarters No
12.	\$1.00	\$ .60	3 dimes, 2 nickels Yes

13. In ex. 6–12, make the change a different way and count it. Ex. 6: 30,40,50,\$1.00; ex. 7: 1.50,2,3,4,\$5; ex. 8: 1.40,1.50,\$2; ex. 9: 2.50,\$3; ex. 10: 4.60, 4.65, 4.75, \$5; ex. 11: 1.30, 1.40, 1.50, \$2; ex. 12: 60, 65, 75, \$1.00

14. Estimate the change from \$5.00 when you spend \$.95. \$4.00

15. Estimate the change from \$2.00 when you spend \$.98. \$1.00

In counting change be sure pupils use accepted method, that is, they should begin with cost of article. If necessary, permit pupils to use play money to find answers in ex. 1–5.

Oral Review

Tell what numbers should be put in the spaces:

1. 1 yr. = .12. mo.

2. $\frac{1}{4}$ yd. = .9. in.

3. $\frac{1}{2}$ hr. = 30. min.

4. 2 wk. = .14. da.

5. 1 mi. = 5280 ft.

6. 30 ft. = .10. yd.

7. 10 pt. = .5. qt.

8. 3 gal. = .12. qt.

9. 1 da. = 24. hr.

10. 1 mi. = 1760 yd.

11. Jim bought 10 ft. of rope at 9¢ a foot. How much did the rope cost? 90¢

12. How much change will Jane get from $5.00 if she buys 2 books at $1.98 each? Estimate the answer. $1.00

Give the answers:

13. (5 × 8) + 3 43 5 + (7 × 7) 54 (9 × 6) + 7 61

14. (9 × 7) + 8 71 6 + (8 × 9) 78 (3 × 9) + 1 28

15. (6 × 5) + 4 34 3 + (4 × 7) 31 (8 × 8) + 2 66

Add these numbers:

16.	24	33	85	47	65	78	90	30
	10	23	14	32	30	51	82	23
	34	56	99	79	95	129	172	53

17. Subtract the numbers in ex. 16. 14, 10, 71, 15, 35, 27, 8, 7

18. Read these Roman numerals:

XXX 30 XVI 16 XXIX 29 XIV 14 XXII 22 XV 15

19. Add 7 to each number;(1) add 9;(2) add 8.(3)

(1), (2) 24, 26 51, 53 36, 38 89, 91 82, 84 45, 47 70, 72 63, 65

17 44 29 82 75 38 63 56

(3) 25 52 37 90 83 46 71 64

20. Multiply each number by 7;(1) by 9;(2) by 8.(3)

(1), (2) 21, 27 35, 45 63, 81 0, 0 28, 36 49, 63 14, 18 42, 54 56, 72

3 5 9 0 4 7 2 6 8

(3) 24 40 72 0 32 56 16 48 64

Conduct this review as quiz program or team contest. Let different pupils take turns acting as quiz master. Keep record of pupils' errors and plan further specialized review if needed.

Present further review of basic skills.

Keeping in Practice

Give the answers. Watch the signs: Stress.

1. 9 ÷ 3 3   6 ÷ 6 1   8 × 2 16   36 ÷ 9 4   15 ÷ 3 5
2. 8 × 5 40   9 + 7 16   3 × 7 21   18 − 9 9   14 + 7 21
3. 6 + 6 12   8 × 4 32   4 + 9 13   15 + 8 23   15 − 8 7
4. 7 × 8 56   8 ÷ 1 8   7 − 3 4   54 ÷ 6 9   16 − 7 9
5. 8 + 9 17   9 × 9 81   8 + 8 16   14 − 5 9   72 ÷ 9 8

Multiply each number by 10; (1) by 20: (2)

	4	7	12	41	32	20	31	24
(1)	40	70	120	410	320	200	310	240
(2)	80	140	240	820	640	400	620	480

Subtract these numbers and check:

7.	6428	7234	8485	4086	5842
	3798	6479	5997	1578	3863
	2630	755	2488	2508	1979
8.	4000	9623	5000	4769	9618
	2153	3695	2268	4349	4569
	1847	5928	2732	420	5049

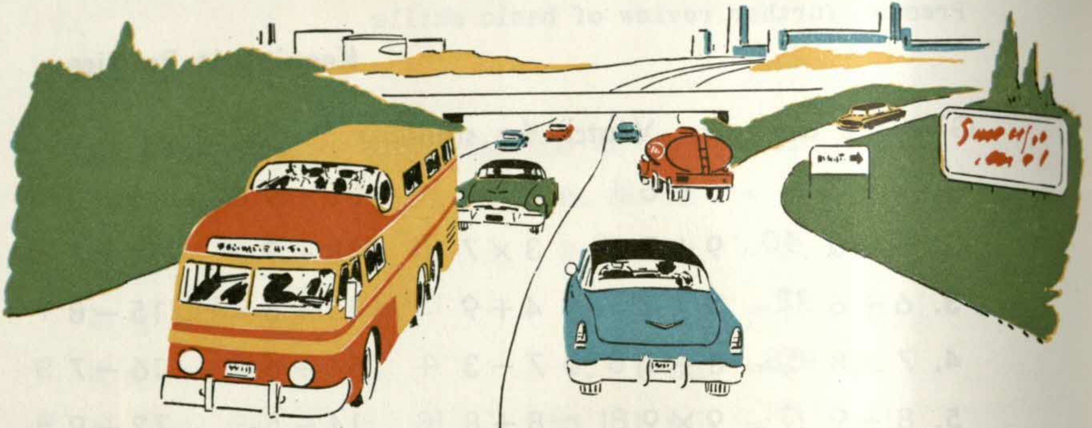
Divide these numbers and check:

9. 8)2848 356   6)2622 437   5)4295 859   3)2367 789   9)6885 765
10. 6)5380 896 R4   3)1905 635   9)2808 312   7)3269 467   4)1948 487
11. 5)3137 627 R2   8)6632 829   4)3863 965 R3   9)4453 494 R7   7)5124 732

Copy in columns, add, and check:

12. 272, 477, 345, 982 2076   580, 137, 547, 465, 313 2042
13. 639, 347, 243, 132 1361   442, 966, 428, 399, 343 2578
14. 605, 372, 165, 888 2030   318, 491, 170, 548, 651 2178

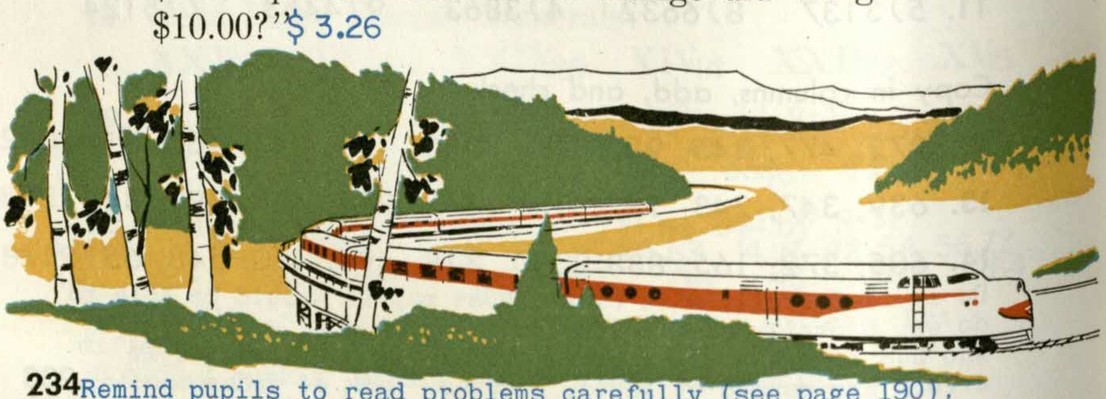
Do ex. 1-5 orally with class. Most pupils should be able to do ex. 6 orally also. After checking papers, group pupils who had mistakes for remedial work. Try to determine if errors are caused by facts, process, lack of understanding, and so on.



Travel Problems

See G-82 for skills used in solving problems.

1. Peter asked the children, "How many miles did I ride in my father's car? We went 1025 mi. the first week and 987 mi. the second week." 2012 mi.
2. Ann said, "I went to Grandmother's by airplane. We left the airfield at 10:42 A.M. and Grandmother met me at 11:50 A.M. How long did the trip take?" 1hr. 8min.
3. Andy said, "I rode on a new train that goes 68 mi. an hour. Is that more or less than 1 mi. a minute?" More
4. Bill asked, "How many people were in the big bus when I rode to the city? There were 7 children, 28 men, 25 women, and the driver." 61 people
5. Peggy said, "Sally and I went to visit Aunt Mary. At the station we bought 2 round-trip tickets for $3.37 apiece. How much change did we get from $10.00?" $ 3.26



Remind pupils to read problems carefully (see page 190), look for hidden questions (ex. 5), and label answers.

6. From the train window Bob counted the cars and engines in a long train. He said, "There were 32 boxcars, 17 flatcars, 2 engines, and a little red car at the end. How many engines and cars were there all together in the train?" 52

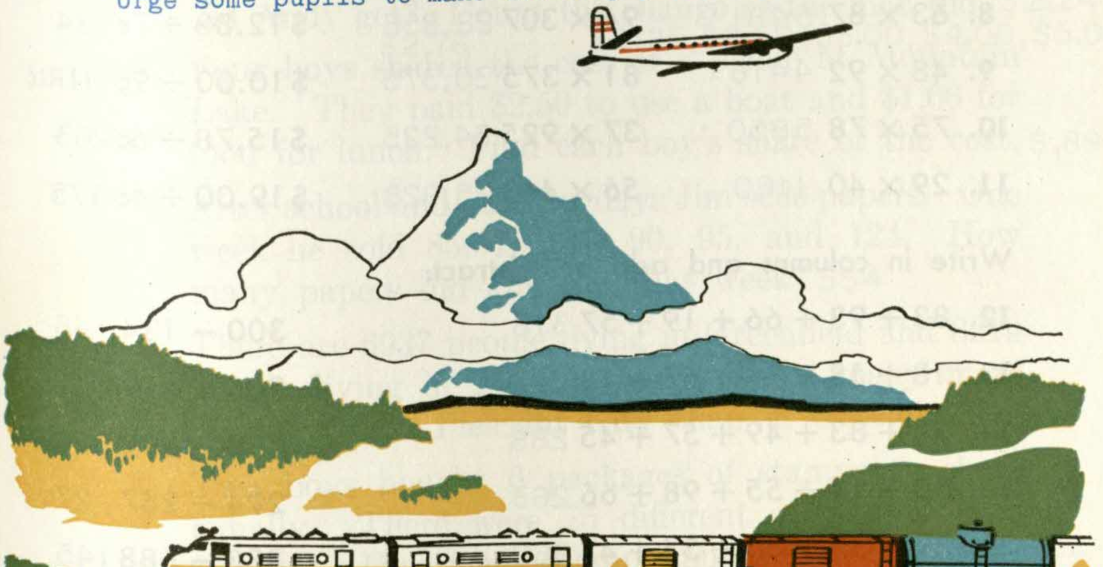
7. Betty had a railroad timetable. She said, "It is 648 mi. from Fairfield to Green Hill and 375 mi. from Fairfield to Lake Clear. How much farther is it from Fairfield to Green Hill than to Lake Clear?" 273 mi.

8. Tom rode in a big airplane. He said, "I traveled in a plane that went 318 mi. an hour for 3 hr. How far did I travel by airplane?" 954 mi.

9. Get a timetable from an airline, a railroad, or a bus line. Learn how to read a timetable. Then tell the time needed to travel from one city to another.

10. Did you take a short trip or a long trip last summer? Make a problem about it for the class to work.

Urge some pupils to make two-step problems.



Use ex. 9 to reinforce idea that method of travel, besides distance, affects time of travel.

See G-83 for correlation of aims with examples.

Chapter Review

1. Write the abbreviations for January, February, August, September, October, November, December. Jan. Feb. Aug. Sept. Oct. Nov. Dec.

2. Write the Roman numerals for 19, 30, 14, 26, 17, 29. XIX XXX XIV XXVI XVII XXIX

3. Which is more, $\frac{1}{2}$ doz. eggs or $\frac{1}{4}$ doz. eggs? $\frac{1}{2}$

4. Estimate the cost of 8 books at $1.95 each. $16.00 Then find the exact cost of the books. $15.60

5. Write the hidden question in this problem: Mary bought a box of 50 birthday cards for $1.98. She sold all of them at 5¢ each. How much did Mary make on the cards? Now work the problem. How much did she receive for the cards? 50 × 5¢ = 250¢ or $2.50. $2.50 − $1.98 = $.52.

6. Count your change from $3.00 when you buy a paint set for $2.39. $2.39, $2.40, $2.50, $3.00

7. Which ones are leap years? 1492 Yes 1914 No 1956 Yes

Copy. Then multiply or divide:

8. 63 × 87 5481 94 × 307 28,858 $12.88 ÷ 7¢ 184

9. 48 × 92 4416 81 × 375 30,375 $10.00 ÷ 9¢ 111R1¢

10. 75 × 78 5850 37 × 925 34,225 $15.78 ÷ 6¢ 263

11. 29 × 40 1160 56 × 463 25,928 $19.00 ÷ 4¢ 475

Write in columns and add or subtract:

12. 83 + 93 + 66 + 19 + 57 318 300 − 134 166

13. 18 + 18 + 79 + 67 + 18 200 806 − 479 327

14. 54 + 83 + 49 + 57 + 45 288 758 − 392 366

15. 30 + 14 + 55 + 98 + 66 263 294 − 267 27

16. 39 + 57 + 85 + 34 + 47 262 833 − 688 145

Note errors on progress cards and group pupils for further review or reteaching (stress meanings). If basic facts cause difficulty, have pupils work with partners, using fact cards.

A Problem Test

Count 10 for each problem you have right.

1. Ann saves all the quarters she gets. Today she counted 57 quarters. How much money is this? $14.25

2. The cooking class made 327 cookies to sell. The price was 4¢ each. How much money did they get if all the cookies were sold? $13.08

3. The girls took in $7.92 from selling cupcakes at 6¢ each. How many cupcakes did they sell? 132

4. Peggy earned $.75. Then Aunt Mary gave Peggy and Peter $2.50 to share equally. How much money did Peggy have then? $2.00

5. Estimate the cost of 30 tickets at $1.95 each. $60.00 Then find the exact answer. $58.50

6. Andy handed the man $5.00 to pay for a cap that cost $1.49 and a tie that cost $.75. How much change did Andy get? $2.76 Count the change as the man did. $2.24, $2.25, $2.50, $3.00, $4.00, $5.00

7. Four boys shared the cost of a picnic at Mountain Lake. They paid $2.50 to use a boat and $1.06 for food for lunch. Find each boy's share of the cost. $.89

8. After school and on Saturdays Jim sells papers. One week he sold 85, 76, 84, 90, 95, and 124. How many papers did Jim sell that week? 554

9. There are 6937 people living in Greenfield and 8219 people living in Pleasant City. How many more people live in Pleasant City than in Greenfield? 1282

10. Two boys bought 6 packages of stamps to share equally. There were 75 different stamps in each package. How many stamps should each boy have? 225

Remind pupils to read problems carefully to determine what the problem asks, what facts are known, what process (or processes) must be used, and how it should be written in numbers. Stress answering of hidden question first, and labeling of answers.

Present diagnostic test of skills taught.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Page for that row.

Add these numbers and check:

						Practice Pages
1.	36 25 43 34 32 170	21 78 16 44 54 213	59 44 24 36 95 258	75 32 57 35 84 283	79 96 45 58 29 307	212
2.	238 661 517 362 145 1923	164 207 776 861 489 2497	315 718 294 441 308 2076	537 286 439 996 527 2785	301 489 155 638 238 1821	233

Multiply these numbers and check: Check by reversing multiplicand and multiplier.

3.	37 30 1110	42 60 2520	94 80 7520	56 20 1120	78 50 3900	204
4.	93 76 7068	61 45 2745	86 37 3182	75 89 6675	54 53 2862	206
5.	318 29 9222	263 58 15,254	124 72 8928	785 64 50,240	492 19 9348	225

Divide these numbers and check:

6.	$4.34 ÷ 7¢ 62	$65.25 ÷ 9¢ 725	221
7.	$9.92 ÷ $.08 124	$50.20 ÷ $.06 836R4¢	221
8.	$8.70 ÷ 5 $1.74	$40.88 ÷ 7 $5.84	233
9.	$4.45 ÷ 9 $.49 R4¢	$31.68 ÷ 8 $3.96	233

Compare results of test with previous ones noted on progress cards. Group pupils who had mistakes to help them determine causes. Use developmental material found on pages related to pupils' difficulties, if reteaching is indicated. Urge pupils to make self-assignments from practice pages.

See G-84 for specific aims of Chapter 7.

Chapter 7

Finding Averages

See G-84 for prelesson discussion of average (arithmetic mean).

1. When Fred works for Mr. Hill, he writes the time in a book, like this: Mon., 2 hr.; Tues., 1 hr.; Wed., 3 hr. How many hours did he work in 3 da.?
▸ Working 6 hr. in 3 da. is the same as working 2 hr. on each of 3 da. We say that 2 is the **average** of 2, 1, and 3. Fred worked an average of 2 hr. a day for 3 da. The extra 1 hr. on Wednesday made up for 1 hr. less he worked on Tuesday.

2. Last week Fred worked these hours: Wed., 3 hr.; Thur., 2 hr.; Fri., 3 hr.; Sat., 4 hr. What was the average number of hours he worked a day? 3

$$\begin{array}{r}3\\2\\3\\4\\\hline 12\end{array}$$

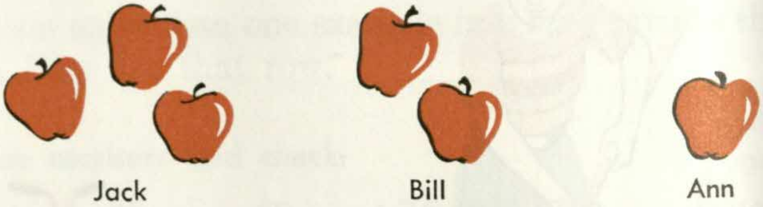
Step 1. Answer this hidden question: How many hours did Fred work in all?

Step 2. Answer the question in the problem. To find the average, divide 12 by 4. You divide by 4 because you added 4 numbers.

$$\begin{array}{r}3\\4\overline{)12}\end{array}$$

Develop idea of how to find averages by having pupils show unequal grouping of counters (11, 18, 7). Then ask how they could make 3 equal groups. Lead pupils to tell you to put groups together (add) and divide into 3 equal groups (divide by 3).

Finding Averages



1. Look at the apples above. Jack, Bill, and Ann each have a different number of apples. If they put all their apples together and divide them equally, they will each have the same number, or 2 apples. The average number, in this case, is 2.

Emphasize.↴

To find the average of several numbers, divide their sum by the number of numbers.

2. Peter keeps hens. He got 14 eggs on Monday, 10 eggs on Tuesday, and 15 eggs on Wednesday. What was the average number of eggs he got a day? 13

3. Peter sold 7 doz. eggs one week, 5 doz. the next week, 5 doz. the third week, 6 doz. the fourth, 7 doz. the fifth. What was the weekly average? 6 doz.

4. On 5 days one week Mary earned 25¢, 45¢, 30¢, 50¢, and 20¢. Find the average number of cents Mary earned a day that week. 34¢

5. In 3 trips to the library Dick carried 9 books, 10 books, and 5 books. What was the average number of books he carried on a trip? 8

6. Jim carried 8 books, 11 books, and 8 books in 3 trips. Find the average number he carried on a trip. 9

Have pupils restate rule for finding averages, given in ex. 2 on page 239, before doing this page. Make up other problems that call for finding averages, such as scores in spelling, weights of four or five children, and so on.

More Averages

1. Miss Wood told Andy his average mark in arithmetic on the last 3 tests was 94. Did this mean that Andy got 94 on each test? No If he got 98, 92, and 92, what would his average be? 94

2. Suppose your monthly marks in arithmetic were 84, 93, 88, 85, and 90. What would be your average mark for 5 months? 88

3. On the 5 school days last week Tom spelled correctly these numbers of words: 16, 18, 14, 20, 17. What is the average number of words a day that Tom spelled correctly? 17

4. Betty practiced 25 min. on Thursday, 40 min. on Friday, and 55 min. on Saturday. What is the average number of minutes she practiced a day? 40

5. Jim has put these amounts of money in the school bank in the last 3 weeks: $2.75, $1.90, $3.00. Find the average amount he saved a week. $2.55

6. Find the average of $43.75, $39.28, $31.60, $40.73. $38.84

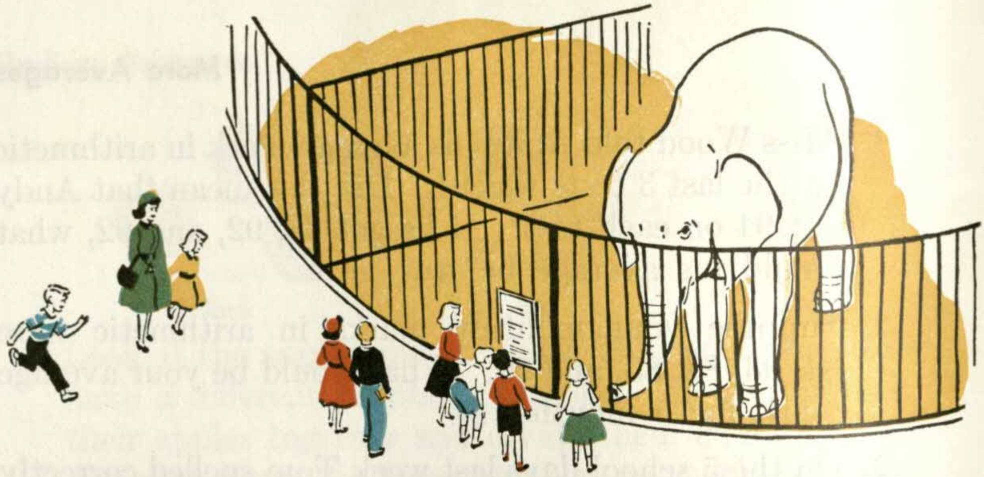
7. Here are 5 marks in arithmetic for some children in John's room. Find each child's average:

	John	Sally	Bill	Jane	Fred
February	90	88	90	88	75
March	80	82	80	82	80
April	85	85	95	80	80
May	95	90	90	93	85
June	90	100	95	97	90
Averages :	88	89	90	88	82

8. Find the average of these numbers:

29, 41, 38 36 215, 233, 225, 211 221 179, 291 235

Provide other opportunities for pupils to find averages, as for end-of-year tests, weekly attendance, and so on.



Measures of Weight

Review measures of weight and teach meaning of ton.

1. A sign on the fence says that the weight of the large elephant is 5 tons. The **ton** is used to measure very heavy things like an elephant, coal, hay, and so on. The ton equals 2000 pounds. How many pounds does the elephant in the picture weigh? 10,000
2. Would 40 children, averaging 55 pounds each, weigh as much as 1 ton? 2200 pounds; yes
3. You learned last year that the **pound** is used to weigh people and things like meat and butter. Name 3 other things that are weighed by the pound.
4. The **ounce** measures light things like a small candy bar. Can you name two other things that you think are weighed in ounces?
5. Here is a table of measures of weight:

Stress.

16 ounces (oz.) = 1 pound (lb.)
2000 pounds (lb.) = 1 ton (T.)

Use pictures of cars, trucks, ships, and so on, contrasted with ones of toys and small objects to develop idea of ton and that size of object determines unit of measure. Have pupils discuss items bought and weighed by ton.

6. Tell which measure of weight should be used with each of these things:

hay ton
coal ton
sugar pound
chicken pound
letter ounce
big fish pound
hen's egg ounce
tiny turtle ounce
truck with sand ton

7. Jim bought a candy bar that was marked "2 oz." How many candy bars like this make 1 lb.? 8

8. The baby elephant in the picture above weighs $\frac{1}{4}$ ton. How many pounds does that elephant weigh? 500

Tell which word (ounce, pound, or ton) goes in each space:

9. Mary mailed a letter weighing 2 ounces.

10. Last winter we burned 20 tons of coal.

11. During this year Ann gained 7 pounds.

12. Mr. Hill's truck can carry 10 tons.

13. Bill caught a little fish weighing 12 ounces.

14. Father sells potatoes in bags that hold 100 pounds.

15. A quarter pound of nuts weighs 4 ounces.

Tell what number should be put in each space:

16. 3 lb. = 48 oz. 2 T. = 4000 lb. $\frac{1}{4}$ lb. = 4 oz.

17. $\frac{1}{2}$ lb. = 8 oz. $\frac{1}{2}$ T. = 1000 lb. $\frac{1}{4}$ T. = 500 lb.

Urge pupils to estimate weight in pounds and ounces of various objects in class. Have children make posters showing different objects and unit of measure that should be used.

Review fundamental skills, especially multiplication and division.

Keeping in Practice

Copy in columns, add, and check:

1. 337, 185, 416, 209 1147 279, 646, 453, 284 1662

2. 240, 738, 595, 566 2139 174, 255, 939, 632 2000

3. 473, 629, 107, 467 1676 479, 546, 788, 475 2288

Subtract these numbers and check the work:

4.	3275	6518	8650	8364	6000
	1966	4556	5867	6579	3644
	1309	1962	2783	1785	2356

Divide each number by 6;(1) by 7;(2) by 8;(3) by 9:(4)

(1),(2) 3R1,2R5 9R3,8R1 5R1,4R3 7R4,6R4 8R4,7R3 7R1,6R1 9R4,8R2
(3)**5.** 19 2R3 57 7R1 31 3R7 46 5R6 52 6R4 43 5R3 58 7R2
(4) 2R1 6R3 3R4 5R1 5R7 4R7 6R4

Multiply. Check the work by going over it:

6.	81	49	97	158	305	438
	67	35	91	42	76	19
	5427	1715	8827	6636	23,180	8322
7.	32	18	92	263	476	790
	23	58	69	84	27	48
	736	1044	6348	22,092	12,852	37,920

Multiply each number by 50:

8. 6 300 12 600 18 900 33 1650 75 3750 81 4050 49 2450

Divide. Check the work by multiplying:

	214R4	457	574	692	368R1
9.	5)1074	8)3656	6)3444	9)6228	7)2577
	761	683R2	324R1	775	569R3
10.	9)6849	3)2051	5)1621	8)6200	4)2279
	487	933R2	321R5	489	693R5
11.	8)3896	5)4667	7)2252	6)2934	9)6242

Note, in particular, any hesitancy and errors in ex. 6–11. Plan remedial programs, stressing meanings. Be sure pupils understand causes of their errors.

Multiplying Larger Numbers

1. **Problem** Next summer Bill and Susan are going on a trip with their mother and father. Mr. Green figures they can make the trip for about $14.75 a day. How much will it cost for 5 days? $73.75

Explanation When you multiply $14.75 by 5, you have to carry three times. You multiply four-place numbers, like $14.75, the same way that you multiply three-place numbers.

Think, "5 × 5 = 25." Write 5 and carry 2. Think, "5 × 7 = 35. 35 + 2 = 37." Write 7 and carry 3. Now think, "5 × 4 = 20. 20 + 3 = 23." Write 3 and carry 2. Think, "5 × 1 = 5. 5 + 2 = 7." Write 7. The 5-day trip will cost $73.75. Check by going over the work.

$$\begin{array}{r} \$14.75 \\ 5 \\ \hline \$73.75 \end{array}$$

2. Find the cost of a week's trip at $14.75 a day. $103.25 Find the cost of a 9-day trip at $16.25 a day. $146.25

Multiply. Check your work by going over it:

3.	6713 8 53,704	2475 3 7425	1825 9 16,425	$60.00 5 $300.00	$37.65 2 $75.30
4.	4071 6 24,426	1690 7 11,830	9174 5 45,870	$24.50 8 $196.00	$38.00 4 $152.00
5.	3764 9 33,876	2589 4 10,356	2386 6 14,316	$19.06 3 $57.18	$45.83 7 $320.81

6. Multiply 5280 by 6; by 4; by 8; by 9. 47,520
31,680 21,120 42,240

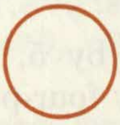
More Practice. See ㉞ on page 324.

Have pupils explain their work to see if triple carrying or addition (adding by endings) is causing errors. Remind pupils that number carried is added "after" the multiplication.

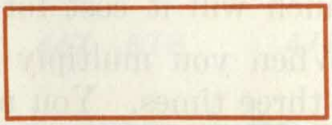
Present five geometric figures and teach name of each.

Some Figures You Know

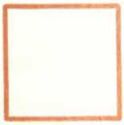
1. Below are some figures you have seen many times. Look around the room and see how many things you can find that have shapes like these figures. Discuss fully



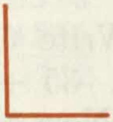
Circle



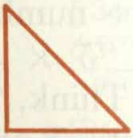
Rectangle



Square



Right Angle



Triangle

2. The corners of a square and a rectangle are called **square corners** or **right angles.**

3. How many right angles are there in a square? 4

4. How many right angles are there in a rectangle? 4

5. Measure the 4 sides of the square above with your ruler. Are all 4 sides the same length? Yes Remember that a square has 4 equal sides and 4 right angles.

6. Measure the 4 sides of the rectangle. Are all 4 sides the same length? No Which sides are the same length? Opposite sides

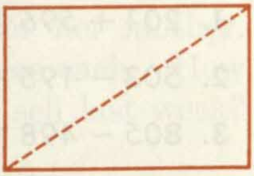
7. Draw and cut out two squares 4 in. long on each side. Use the corner of a small box or of a book to make square corners.

8. Fold one square in half. What is the figure you get? Rectangle How many of these figures have you? Two

9. Fold the second square in half another way to make a different figure. How many of these have you? Two

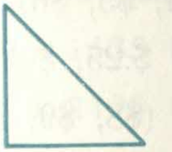
Place names of figures on vocabulary chart. Have different pupils draw corresponding figure on board. Give pupils opportunity to point to the different figures and tell their names. Use corners in room to amplify right angles.

1. Draw and cut out a rectangle. Make two sides of it each 4 in. long and the other sides each 6 in. long.

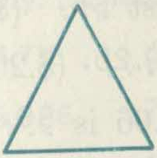


2. Cut your rectangle into two equal parts, as shown at the right. You get 2 triangles. Each of these triangles has one right angle. Can you find the right angle in each triangle? The angle opposite the cut edge

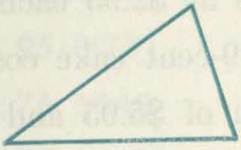
3. The figures below are all triangles. Every triangle has 3 sides. Every triangle does not have a right angle. Which of the triangles below have a right angle? A and D



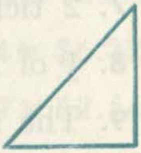
A



B



C



D

4. Name some things you see at home or outdoors that are shaped like rectangles.

5. Can you name anything at home that is square?

6. Draw a rectangle and divide it into 2 equal parts, but do not divide it into 2 triangles. Draw another rectangle and divide it into 4 smaller rectangles.

7. You can see many things that are shaped like a circle. A wheel is shaped like a circle. Name three other things that are shaped like a circle.

8. To make a small circle, lay the cap of a milk bottle on paper and draw around it. What else could you use to draw a circle?

Have pupils begin scrapbook of geometric figures, showing the different figures and some illustrations of each (cut out of magazines). Use flash cards (figure on one side, name on other) to reinforce recognition.

Estimating Answers

Estimate the answers to these examples without using your pencil. Then find the exact answers: Estimate listed first, exact answer second.

1. 201 + 596 800,797 798 ÷ 4 200,199R2 7 × 19 140,133

2. 503 − 195 300,308 403 × 5 2000,2015 9 × 41 360,369

3. 805 − 498 300,307 239 ÷ 6 40,39R5 6 × 78 480,468

4. 696 + 203 900,899 79 + 18 100,97 5 × 62 300,310

Which of the 3 numbers is the best estimate of the answer?

5. 4 books at $1.98 each cost $8. ($4, $8, $12)

6. 2 games at $.99 each cost $2. ($2, $3, $4)

7. 2 tickets at $2.95 each cost $6. ($4, $5, $6)

8. ½ of a 49-cent cake costs $.25. ($.20, $.25, $.30)

9. The sum of $5.95 and $3.06 is $9. ($8, $9, $10)

10. $6.02 minus $1.95 is $4. ($5, $4, $3)

11. 7 sweaters at $4.95 each cost $35. ($28, $30, $35)

12. ½ of a 61-cent pie costs $.30. ($.30, $.35, $.40)

Estimate the answer to each of these problems. Do the work mentally. Then find the exact answer: Estimate first, exact answer second.

13. Our school has 2 new swings that cost $19.95 each. How much did the swings cost? $40, $39.90

14. The school library has a new set of 8 books that cost $39.52. Find the cost of 1 book. $5, $4.94

15. Jim has $10.00 he got for his birthday. He wants to buy a toy airplane that costs $7.95. How much will he have left? $2, $2.05

Remind pupils that in estimating answers the exact number from the problem is not used. We use one that means about the same (mentally changed to nearest ten or hundred). Give further practice if needed.

Review difficult multiplication and division.

Problems and Practice

1. Tom is trying to save $1.75 each week. How much money will he save in 52 weeks? $91.00

2. Last week Betty sold 450 cookies for her mother. She sold them in packages of 6 cookies each. How many packages of cookies did Betty sell last week? 75

3. Find the product of 36 and 79. 2844

4. Multiply 638 by 6; 3828 $1.48 by 59; $87.32 73 by 49. 3577

5. Find the quotient when 3228 is divided by 6. 538

6. Divide 423 by 9; 47 2539 by 8; 317 R3 2605 by 5. 521

Copy and multiply. **Check the work by going over it:** Stress.

7. 9 × 1635 14,715 65 × 95 6175 14 × $6.32 $88.48
8. 7 × 2198 15,386 73 × 76 5548 29 × $2.56 $74.24
9. 6 × 8637 51,822 29 × 97 2813 59 × $1.48 $87.32
10. 8 × 4075 32,600 82 × 68 5576 75 × $1.36 $102.00
11. 4 × 3964 15,856 31 × 58 1798 83 × $2.39 $198.37
12. 5 × 2780 13,900 54 × 97 5238 67 × $2.45 $164.15

Copy and divide. **Check the work by multiplying:** Stress.

13. 450 ÷ 6 75 7605 ÷ 9 845 4243 ÷ 5 848 R3
14. 865 ÷ 4 216 R1 1456 ÷ 8 182 1047 ÷ 2 523 R1
15. 708 ÷ 3 236 5222 ÷ 7 746 3870 ÷ 9 430
16. 628 ÷ 5 125 R3 3728 ÷ 4 932 3648 ÷ 8 456
17. 931 ÷ 7 133 2535 ÷ 3 845 4297 ÷ 6 716 R1
18. 632 ÷ 8 79 5004 ÷ 6 834 6273 ÷ 9 697

Pupils who have shown mastery of these skills may omit this work. Let them work on projects, puzzles, and so on, for arithmetic corner. Give individual help to others and try to determine causes of errors.

Our Bird Friends

Present word problems dealing with nature-study unit.

1. Birds help people in many ways. To help the birds, people have made many bird parks in different parts of our country. The first bird park was started in the South in 1903. How many years ago was the first park for birds started?

2. Have you ever visited a bird park? If you have, tell the class what you saw there.

3. Birds save our trees from being eaten by worms. One kind of bird often eats 250 worm eggs each time it visits a tree. If it stops 3 times a day, how many worm eggs will it eat in a day? 750

4. Suppose 25 of these birds each eat 750 worm eggs a day. How many worm eggs will they eat all together in a day? 18,750

5. A young robin will eat about 4 ft. of earthworms in 1 day. Four young robins in a nest will eat about how many feet of earthworms in a day? 16 How many inches of worms is this? 192 How many 6-inch worms does this make? 32

In doing these problems, develop awareness of many ways arithmetic helps us understand world we live in. See G-87 for related learnings on these pages.

6. Some kinds of birds eat small flies. Suppose a bird eats 750 small flies in a day. How many flies will it eat in a week? 5250

7. Many birds fly to the South in the fall. Some birds fly about 17 mi. in 1 hr. How far do they fly in 8 hr.? 136 mi. in 12 hr.? 204 mi.

8. Other birds fly much faster and go 50 mi. in 1 hr. How far do they fly in 8 hr.? 400 mi. in 12 hr.? 600 mi.

9. Bill read about birds that fly over high mountains. They fly as high as 2 mi. up in the air. How many feet high do they fly? 10,560

10. A crow lives to be very old. It may live to be 100 yr. old. 88 A robin lives to be about 12 yr. old. How many more years may a crow live than a robin? Do people ever live to be 100 yr. old? Yes

11. Ann says that a crow lives about 8 times as long as a robin. Is Ann right? $8 \times 12 = 96$; yes

12. Tell the class some things each of you can do to help the birds to live near your home.

Ex. 12 may be extended to include nature study and investigation of habits, and so on, of birds native to your location.

Oral Review

Estimate the answers in ex. 1–3:

1. Dog food sells at 19¢ a can. About how much will 3 cans of dog food cost? About 60¢

2. Cupcakes cost 39¢ a dozen. About how much will 2 doz. cupcakes cost? About 80¢

3. Uncle Jim has 294 stamps to divide equally among 3 boys. About how many stamps will each boy get? About 100

Add 5 to each number;(1) add 7 to each one;(2) add 9:(3)

(1),(2) 81,83 37,39 52,54 86,88 30,32 63,65 98,100 54,56
(3) **4.** 76 85 32 41 47 56 81 90 25 34 58 67 93 102 49 58

69,71 64,66 40,42 22,24 68,70 45,47 91,93 33,35
5. 64 73 59 68 35 44 17 26 63 72 40 49 86 95 28 37

Divide these numbers:

6. $6\overline{)48}$ 8 $7\overline{)56}$ 8 $9\overline{)72}$ 8 $5\overline{)50}$ 10 $8\overline{)40}$ 5 $3\overline{)19}$ 6R1

7. $3\overline{)21}$ 7 $8\overline{)64}$ 8 $4\overline{)84}$ 21 $7\overline{)77}$ 11 $6\overline{)60}$ 10 $2\overline{)17}$ 8R1

Tell the number to put in each space:

8. 4 qt. = . . . 8 pt. $\frac{1}{2}$ yd. = . . . 18 in.
9. 6 wk. = . . . 42 da. $\frac{1}{4}$ lb. = . . . 4 oz.
10. 9 yd. = . . . 27 ft. $\frac{1}{2}$ da. = . . . 12 hr.
11. 9 ft. = . . . 3 yd. $\frac{1}{4}$ yr. = . . . 3 mo.

Tell the answers. Watch the signs: Stress.

12. 50 × 3 150 $\frac{1}{2}$ of 16 8 36 ÷ 9 4 $\frac{1}{5}$ of 105 21
13. 42 + 7 49 $\frac{1}{4}$ of 28 7 36 ÷ 6 6 $\frac{1}{9}$ of 180 20
14. 37 − 5 32 $\frac{1}{8}$ of 72 9 36 ÷ 4 9 $\frac{1}{6}$ of 126 21

This review could be conducted as a quiz program, with different children acting as quiz master. Some pupils may need further review of abbreviations in ex. 8-11.

Magic Squares

8	3	4
1	5	9
6	7	2

1. At the right is a magic square. Add the three numbers in the top row like this: 8 + 3 + 4. Then add the three numbers in the middle row; then the three in the bottom row. What is the sum each time? 15

2. Next add the three numbers in the left column: 6 + 1 + 8. Then add the middle column and next add the right column. What is the sum each time? 15

3. Add the three numbers along one of the dotted lines, 6 + 5 + 4. Then add the three numbers along the other dotted line. You have found 8 sums in all. What is true about all 8 sums? All sums are alike.

4. In each square, find the 8 sums as you did in ex. 1–3. Are the 8 sums alike? If so, it is a magic square. All are magic squares.

Sums: 18

3	8	7
10	6	2
5	4	9

39

12	17	10
11	13	15
16	9	14

18

9	1	8
5	6	7
4	11	3

36

9	19	8
11	12	13
16	5	15

60

16	36	8
12	20	28
32	4	24

99

34	29	36
35	33	31
30	37	32

More Practice. See ㉟ on page 325.

This activity is purely recreational in nature. Urge more advanced students to make a four-by-four square. Further activities include: multiplying each number by 2, adding or subtracting 1 for each number.

Present written review of averages, multiplication, and division.

Review Practice

1. Ann earns money after school and on Saturdays. Last week on 6 days she earned \$.50, \$.75, \$.60, \$.80, \$.60, and \$1.25. What was the average number of cents Ann earned a day? \$.75

2. On 5 school days last week Bill earned \$.90, \$1.00, \$.75, \$.80, and \$.75. Find the average number of cents he earned a day. \$.84

Find the average of these numbers:

3. 25, 38, 29, 32 31

4. 19, 14, 18, 17 17

5. 46, 35, 38, 41 40

6. 65, 57, 55, 51 57

7. 115, 128, 122, 111 119

8. 207, 193, 218, 214 208

9. 285, 463, 329, 271 337

10. 506, 499, 518, 473 499

Answers to ex. 11-17 are given in order at end of example.

11. Multiply 174 by 27; by 35; 90; 46; 82; 51. 4698; 6090; 15,660; 8004; 14,268; 8874

12. Multiply 539 by 40; by 76; 23; 65; 19; 87. 21,560; 40,964; 12,397; 35,035; 10,241; 46,893

13. Multiply 286 by 17; by 54; 91; 32; 68; 34. 4862; 15,444; 26,026; 9152; 19,448; 9724

14. Divide 1746 by 3; by 4; 9; 6; 5; 7. 582; 436 R2; 194; 291; 349 R1; 249 R3

15. Divide 2624 by 8; by 5; 3; 7; 9; 4. 328; 524 R4; 874 R2; 374 R6; 291 R5; 656

16. Divide 1688 by 6; by 8; 5; 4; 2; 7. 281 R2; 211; 337 R3; 422; 844; 241 R1

17. Divide 2520 by 9; by 7; 8; 5; 3; 4. 280; 360; 315; 504; 840; 630

Review rule for finding averages first. Then have pupils proceed with ex. 1-17. After checking papers, group those who had errors or showed hesitancy, for remedial work. Let others work on magic squares.

Ex. 3 illustrates the distributive principle for multiplication with respect to addition.

The 12's in Multiplication

1. To find how many inches there are in 6 ft., you multiply 12 in. by 6 and get 72 in. To find how many eggs there are in 4 doz., you multiply 12 eggs by 4 and get 48 eggs. Since the number 12 is often used in examples like these, it saves time to remember facts like 6 × 12 = 72 and 4 × 12 = 48 instead of multiplying them out. There are 12 months in the year and 12 hours on the clock, too.

Stress additive nature, as "one 12 is...," and so on.

2. Try to remember these facts for 12:

12	12	12	12	12	12	12	12	12
1	2	3	4	5	6	7	8	9
12	24	36	48	60	72	84	96	108

3. Suppose you forget any of the facts in ex. 2. You can help yourself to get the answer by multiplying in this way: For 7 × 12, think, "7 × 10 = 70 and 7 × 2 = 14. 70 + 14 = 84." For 9 × 12, think, "9 × 10 = 90 and 9 × 2 = 18. 90 + 18 = 108." What should you think for 6 × 12? for 8 × 12? 8x10=80, 8x2=16, 80+16=96

6x10=60, 6x2=12, 60+12=72

4. How many eggs are there in 5 doz.? 60 in 8 doz.? 96 in 3 doz.? 36 in 7 doz.? 84

5. How many inches are there in 4 ft.? 48 in 2 ft.? 24 in 6 ft.? 72 in 9 ft.? 108

6. Tom is 4 ft. tall. How many inches tall is he? 48

7. Ann is 4 ft. 2 in. tall. How many inches tall is Ann? 50

8. How many inches tall are these children?

Bob:	4 ft. 8 in. 56	**Fred:**	4 ft. 5 in. 53	**Mary:**	3 ft. 10 in. 46
Bill:	3 ft. 9 in. 45	**Dick:**	4 ft. 1 in. 49	**Jack:**	3 ft. 11 in. 47
Jim:	4 ft. 6 in. 54	**Joe:**	3 ft. 7 in. 43	**Alice:**	2 ft. 11 in. 35

If pupils are of average ability, the teaching of the 12's is advisable: see G-88, 89 for further discussion. Follow development as given on this page. Emphasize ex. 3 explanation. Prove facts by addition.

Zero in the Middle of Quotients

$$\begin{array}{r} \$8.07 \\ 3\overline{)\$24.21} \\ 24 \\ \hline 2 \\ 0 \\ \hline 21 \\ 21 \\ \hline \end{array}$$

1. Problem Father paid \$24.21 for 3 bus tickets to Castle Hill. How much did each ticket cost? \$ 8.07

Explanation Study the example at the right. When you divide 24 by 3, you get 8 and there is no remainder. You bring down 2 but there are no 3's in 2. So the second quotient figure is 0. Write 0 in the quotient. Then think, "$0 \times 3 = 0$." Write 0 under 2 and subtract. Bring down 1 and divide 21 by 3. Write 7 in the quotient. Each ticket cost \$8.07.

Emphasize.

Be sure to write a figure in the quotient each time you bring down a figure.

2. Mrs. Hill paid \$4.12 for 4 pairs of stockings. Find the cost of 1 pair. \$1.03

Divide and check your work:

3.	$\overset{406}{2\overline{)812}}$	$\overset{105}{6\overline{)630}}$	$\overset{307\text{R}2}{4\overline{)1230}}$	$\overset{708\text{R}3}{9\overline{)6375}}$	$\overset{205}{5\overline{)1025}}$
4.	$\overset{106}{5\overline{)530}}$	$\overset{204}{3\overline{)612}}$	$\overset{508}{8\overline{)4064}}$	$\overset{705\text{R}1}{2\overline{)1411}}$	$\overset{906\text{R}2}{8\overline{)7250}}$
5.	$\overset{209}{4\overline{)836}}$	$\overset{208\text{R}1}{2\overline{)417}}$	$\overset{609\text{R}1}{6\overline{)3655}}$	$\overset{704}{7\overline{)4928}}$	$\overset{306}{9\overline{)2754}}$
6.	$\overset{309\text{R}1}{3\overline{)928}}$	$\overset{109}{7\overline{)763}}$	$\overset{407\text{R}1}{5\overline{)2036}}$	$\overset{809}{3\overline{)2427}}$	$\overset{408}{6\overline{)2448}}$
7.	$\overset{106\text{R}1}{4\overline{)425}}$	$\overset{102}{5\overline{)510}}$	$\overset{406}{8\overline{)3248}}$	$\overset{903}{5\overline{)4515}}$	$\overset{308}{7\overline{)2156}}$
8.	$\overset{309}{2\overline{)618}}$	$\overset{105\text{R}4}{9\overline{)949}}$	$\overset{503}{4\overline{)2012}}$	$\overset{904}{9\overline{)8136}}$	$\overset{607}{3\overline{)1821}}$

Discuss ex. 1 with pupils, stressing place value and place-holding nature of zero. Ask why zero is unnecessary after subtracting 24 from 24, but is necessary in quotient (shows that 2 has been divided and that there are no tens).

Provide oral test in number meanings, fractional concepts, and measures.

Testing Your Thinking

Show that you know the meaning of each of these by writing "Yes" or "No" on your paper. Count 5 for each answer you have right and find your score:

1. Is 9999 the largest four-place number? Yes
2. Is 20 × 34 equal to 360? No
3. Is 140 a good estimate for 7 × 19? Yes
4. Is 2007 read "two thousand seven"? Yes
5. Does water freeze when the temperature is 50°? No
6. Does a whole pie equal four fourths? Yes
7. Does the Roman numeral XXV mean 15? No
8. Does a dog weigh as much as a ton? No
9. Is $\frac{1}{2}$ of a thing larger than $\frac{1}{4}$ of that thing? Yes
10. Does the month of June have 31 days? No
11. Do you go to school at 8:30 P.M.? No
12. Does the 2 in 32,417 mean 2 thousands? Yes
13. Is 10,000 the largest five-place number? No
14. Is 100 a good estimate for 297 ÷ 3? Yes
15. Could a man be 6 yd. tall? No
16. Does a year ever have more than 365 da.? Yes
17. Is it 14 hr. from 8 A.M. to 6 P.M.? No
18. Does a triangle always have 3 sides? Yes
19. Does $\frac{1}{4}$ lb. of candy equal 8 oz. of candy? No
20. Is a quarter past 2 the same as 2:15? Yes

See G-89 for topic coverage of each question. Use this test to spot-check for class or individual weaknesses. Group pupils who need further review or reteaching (stress meanings).

Zeros in the Quotient

1. **Problem** In a race Jack ran $\frac{1}{8}$ mi. How many feet are there in $\frac{1}{8}$ mi.? 660 5280 ft. = 1 mi.

Explanation Study the work at the right. When you finish the second step, there is no remainder. But there is still 0 to bring down. This means there must be another figure in the quotient. There are no 8's in 0, so the last figure of the quotient is 0. The answer is 660. Jack ran 660 ft.

$$\begin{array}{r}
660\\
8\overline{)5280}\\
\underline{48}\\
48\\
\underline{48}\\
0\\
\underline{0}
\end{array}$$

2. Study these examples. Then check each example:

$$\begin{array}{r}
650\\
3\overline{)1950}\\
\underline{18}\\
15\\
\underline{15}\\
0\\
\underline{0}
\end{array}
\qquad
\begin{array}{r}
590\text{ R}4\\
5\overline{)2954}\phantom{\text{ R}4}\\
\underline{25}\phantom{00\text{ R}4}\\
45\phantom{0\text{ R}4}\\
\underline{45}\phantom{0\text{ R}4}\\
4\phantom{\text{ R}4}\\
\underline{0}\phantom{\text{ R}4}\\
4\text{ R}
\end{array}
\qquad
\begin{array}{r}
700\\
9\overline{)6300}\\
\underline{63}\\
0\\
\underline{0}\\
0\\
\underline{0}
\end{array}
\qquad
\begin{array}{r}
600\text{ R}3\\
4\overline{)2403}\phantom{\text{ R}3}\\
\underline{24}\phantom{00\text{ R}3}\\
0\phantom{0\text{ R}3}\\
\underline{0}\phantom{0\text{ R}3}\\
3\phantom{\text{ R}3}\\
\underline{0}\phantom{\text{ R}3}\\
3\text{ R}
\end{array}$$

Divide these numbers. Check your work: Stress.

3. $\begin{array}{r}10\text{R}2\\6\overline{)62}\end{array}$ $\begin{array}{r}80\text{R}5\\8\overline{)645}\end{array}$ $\begin{array}{r}800\text{R}2\\5\overline{)4002}\end{array}$ $\begin{array}{r}703\\7\overline{)4921}\end{array}$ $\begin{array}{r}650\\4\overline{)2600}\end{array}$

4. $\begin{array}{r}10\text{R}6\\9\overline{)96}\end{array}$ $\begin{array}{r}130\\7\overline{)910}\end{array}$ $\begin{array}{r}420\\9\overline{)3780}\end{array}$ $\begin{array}{r}706\\5\overline{)3530}\end{array}$ $\begin{array}{r}600\\8\overline{)4800}\end{array}$

5. $\begin{array}{r}10\text{R}2\\5\overline{)52}\end{array}$ $\begin{array}{r}190\\3\overline{)570}\end{array}$ $\begin{array}{r}500\\6\overline{)3000}\end{array}$ $\begin{array}{r}205\\8\overline{)1640}\end{array}$ $\begin{array}{r}420\\6\overline{)2520}\end{array}$

Divide each number by 6;(1) **by 3;**(2) **by 5;**(3) **by 9:**(4)*

(1),(2) 400R3,801 240,480 280R1,560R1 450R2,900R2 420,840
(3) **6.** 2403 480R3 1440 288 1681 336R1 2702 540R2 2520 504
325,650 290R2,580R2 390,780 350R5,701R2 230,460
7. 1950 390 1742 348R2 2340 468 2105 421 1380 276

*(4) Ex. 6: 267, 160, 186R7, 300R2, 280; ex. 7: 216R6, 193R5, 260, 233R8, 153R3

Have pupils explain ex. 2. Check understandings by asking pupils why zero is needed in quotient (see page 256). Group pupils for individual help in doing this work.

Present oral test on basic addition, subtraction, multiplication, and division facts.

Oral Test

Give the quotients quickly:

8 5 4 7 9 5 6
1. 2)16 7)35 5)20 9)63 4)36 8)40 6)36

8 7 8 3 6 3 9
2. 8)64 3)21 6)48 4)12 7)42 5)15 3)27

4 9 5 7 4 7 8
3. 4)16 9)81 5)25 7)49 6)24 4)28 7)56

5 9 8 9 8 6 9
4. 6)30 5)45 3)24 8)72 4)32 9)54 2)18

Give the products quickly:

5. 9 6 7 6 9 6 5 4 2
7 6 4 9 3 7 5 5 7
63 36 28 54 27 42 25 20 14

6. 9 7 3 9 8 5 4 5 8
9 8 6 5 8 8 3 7 9
81 56 18 45 64 40 12 35 72

7. 6 3 8 4 4 5 7 4 7
4 5 6 9 4 6 7 8 9
24 15 48 36 16 30 49 32 63

8. Use ex. 5–7 as addition facts and give the sums as quickly as you can. Ex.5: 16, 12, 11, 15, 12, 13, 10, 9, 9; ex.6: 18, 15, 9, 14, 16, 13, 7, 12, 17; ex.7: 10, 8, 14, 13, 8, 11, 14, 12, 16

Give the remainders as quickly as you can:

9. 8 7 15 13 10 17 14 11 15
2 4 6 7 4 9 8 7 8
6 3 9 6 6 8 6 4 7

10. 9 8 18 12 16 11 10 13 14
6 5 9 4 7 5 7 4 5
3 3 9 8 9 6 3 9 9

There are 100 facts in this test. Count 1 for each correct answer. You should have a score of 90 or more. If not, learn the facts you missed and try the test again next week.

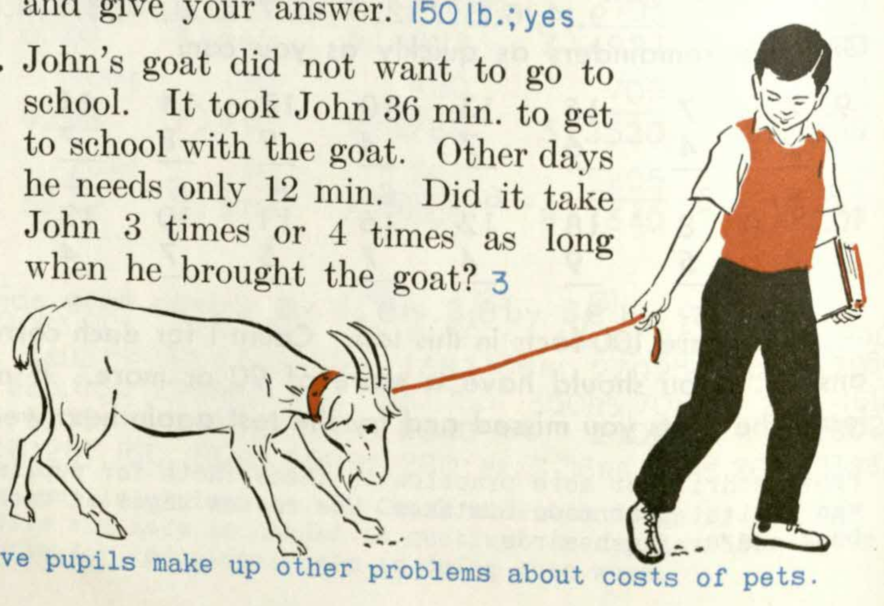
Provide drill or more practice on these facts for pupils who hesitated or made mistakes. Use review pages at back of book and/or flash cards.

Present word problems stressing comparison by subtraction and division.

The Pet Show

The children brought their pets to school for a show. Here are some problems about the pets.

1. At the show there were 11 cats, 15 dogs, 24 fish, 7 birds, 1 goat, and 4 turtles. How many pets were there all together? 62
2. Of the 15 dogs, 6 had long hair. The rest had short hair. How many dogs had short hair? 9
3. Three girls brought the 24 fish. Mary had 6 fish in her bowl. The other two girls each had the same number of fish. How many fish was that? 9
4. Bob's dog is Wiggles. When Wiggles was a puppy, he cost \$10. Today he is worth \$50. How much more is Wiggles worth now than he was as a puppy? \$40
5. The biggest dog in the show weighed 150 lb. The smallest dog weighed 2 lb. How many pounds more than the smallest dog did the biggest dog weigh? 148
6. Jack said, "The biggest dog weighed 75 times as much as the smallest dog." Is Jack right? Multiply and give your answer. 150 lb.; yes
7. John's goat did not want to go to school. It took John 36 min. to get to school with the goat. Other days he needs only 12 min. Did it take John 3 times or 4 times as long when he brought the goat? 3



Have pupils make up other problems about costs of pets.

Provide a comprehensive written review of skills and understandings. See G-91 for correlation of review topics with examples.

Mixed Practice

Copy in columns, add, and check:

1. 9209, 2033, 4613 15,855 5607, 7275, 6494, 7972 27,348

2. 3018, 1223, 6341 10,582 5764, 1615, 7159, 2286 16,824

3. Write the largest 4-place number; 9999 the smallest 5-place number; 10,000 the largest 5-place number; 99,999 the largest 6-place number. 999,999

4. Write the number **fifty-seven thousand forty-three.** 57,043 Show that you know what this number means. 5 ten-thousands, 7 thousands, 0 hundreds, 4 tens, 3 ones

5. Find the difference between 9000 and 4275. 4725

Subtract the second number from the first one. Check:

6. 5246, 3498 1748 6000, 2138 3862 3291, 2733 558

7. 8653, 6354 2299 7055, 4685 2370 4588, 3999 589

8. 8414, 3596 4818 7742, 3963 3779 2000, 1954 46

9. Write the Roman numerals that stand for 9, IX 11, XI 14, XIV 17, XVII 19, XIX 25, XXV 29, XXIX 30. XXX

10. Find the product of 528 and 64; 33,792 of 794 and 50. 39,700

11. Find the average of 81, 63, 59, 72, and 80. 71

12. How many 7's are there in 6286? 898 in 3542? 506

13. Find the product of 2375 and 8; 19,000 of 2040 and 9. 18,360

14. Find $\frac{1}{3}$ of 2934; 978 $\frac{1}{5}$ of 1900; 380 $\frac{1}{9}$ of 8118. 902

On paper write the numbers that go in the spaces:

15. $\frac{1}{3}$ hr. = . 20 min. $\frac{1}{8}$ mi. = . 660 ft.

16. $\frac{1}{2}$ lb. = . . 8 oz. $\frac{1}{2}$ mi. = . 880 yd.

Note areas of class or individual weaknesses. Plan for further review or reteaching, using developmental material found on pages related to pupils' difficulties or "More Practice" pages.

Provide practice in solving word problems.

Can You Do These Problems?

1. Betty buys her lunch at school. She pays $.30 a day for lunch. How much does lunch for 5 school days cost? $1.50

2. Bob and Joe bought a small radio for $19.50. They shared the cost equally. How much did each boy pay toward the radio? $9.75

3. Jim keeps hens and sells eggs. From Monday through Friday he got 8 eggs, 11 eggs, 9 eggs, 7 eggs, 10 eggs. Find the average number of eggs that Jim got a day. 9

4. For 15 wk. Mary has saved $.25 a week. How much more does she need to save to have $5.00? $1.25

5. Bill bought an old bicycle for $11.00. He bought 2 new tires at $2.25 each and paid $1.19 for paint and other things. How much did Bill spend in all? $16.69

6. Ann went to the store with $3.00. She spent $.39, $.85, and $1.23. How much money did she have left? $.53

7. There were 270 children in 6 school busses. The same number of children rode in each bus. How many children were in each bus? 45

8. In the 6 rooms in Tom's school there are these numbers of children: 41, 36, 29, 38, 35, 37. How many children are there in all? 216

9. Father drove 1136 mi. to Grand Lake. On the way home he drove 1350 mi. How many miles more did he drive coming home than going to Grand Lake? 214

Remind pupils to read problems carefully to determine what is asked, what facts are known, what process (or processes) should be used, how should problem be written in numbers. Give reading help where needed.

Provide practice in mental arithmetic.

Read each exercise below. Then tell whether it is right or wrong by saying "Yes" or "No":

1. There are 52 weeks in a year. Yes
2. Ann is 4 ft. tall and weighs 53 tons. No
3. A triangle is a figure with 4 sides. No
4. A half pound of candy weighs 8 oz. Yes
5. The product of 144 and 6 is 24. No
6. The average of 4, 11, and 9 is 8. Yes
7. The sum of 3, 9, 5, 1, 2, and 4 is 23. No
8. The difference between 57 and 30 is 87. No
9. In March there are 4 weeks and 3 days. Yes
10. Two weeks at camp at $14 a week cost $28. Yes
11. A box of books weighs 50 lb., or $\frac{1}{4}$ ton. No
12. A 6-quart can holds more than a gallon. Yes
13. The corners of a book cover are right angles. Yes
14. To find $\frac{1}{3}$ of a number, multiply the number by 3. No
15. The time between 1:15 P.M. and 1:50 P.M. is 40 min. No
16. If 6 is subtracted from 144, the remainder is 138. Yes
17. You spend 12¢ out of 50¢. Your change should be 3 cents, 1 dime, and 1 quarter. Yes
18. You spend a half dollar to buy 5-cent lollipops. You get 7 lollipops all together. No
19. You sell 9 boxes of eggs with a dozen eggs in each box. You sell 108 eggs in all. Yes

Do not permit pupils to use pencil and paper. Let different pupils act as the teacher, calling on others for answers. See page 257 for other suggestions.

Provide problems based on travel experiences, stressing costs of travel. See G-92 for extension of lesson.

A Summer Trip

1. Jane Bell's father and mother took her on a trip by car. They drove 5 days to get to Grand Lake. The first day they traveled 275 mi.; the second day, 310 mi.; the third day, 290 mi.; the fourth day, 280 mi.; the fifth day, 255 mi. What was the average number of miles they traveled a day? 282

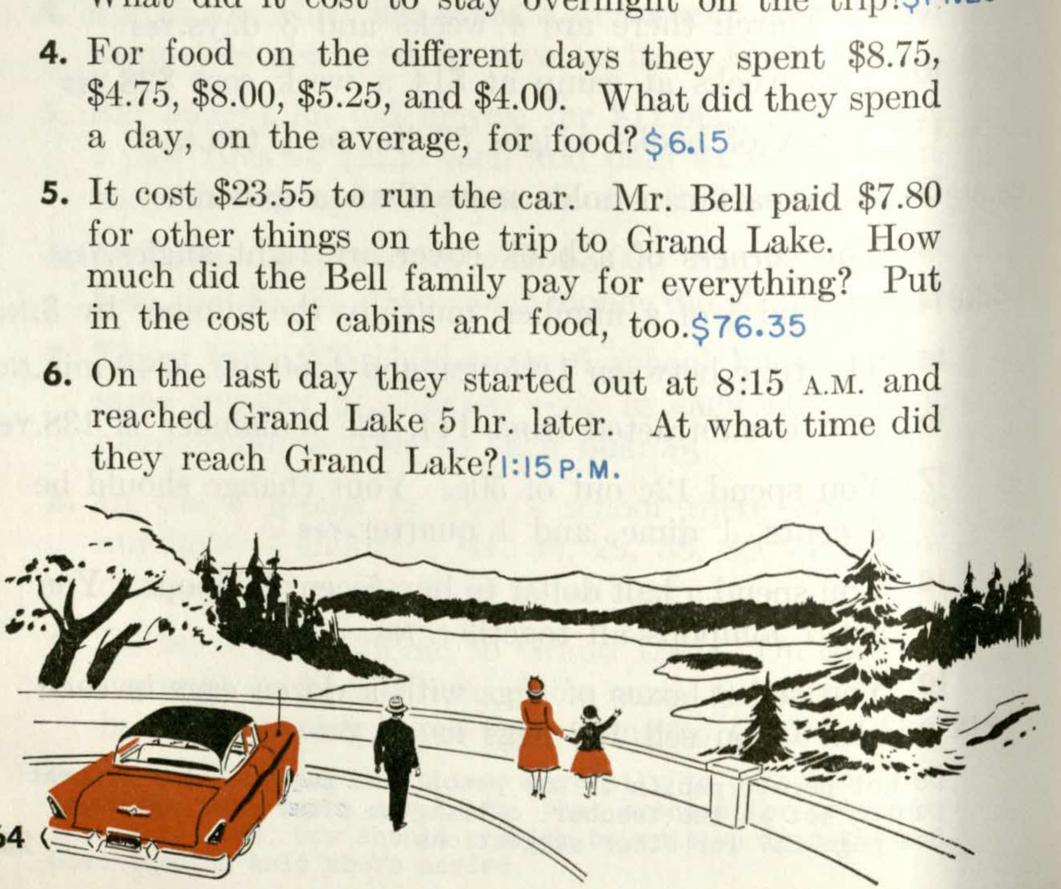
2. In the first step in ex. 1 you found the number of miles the Bell family traveled all together. Jane's mother and father each drove about half the way. How many miles did each one drive? 705

3. The Bell family stayed with friends on two nights. Cabins for the other two nights cost $7.50 and $6.75. What did it cost to stay overnight on the trip? $14.25

4. For food on the different days they spent $8.75, $4.75, $8.00, $5.25, and $4.00. What did they spend a day, on the average, for food? $6.15

5. It cost $23.55 to run the car. Mr. Bell paid $7.80 for other things on the trip to Grand Lake. How much did the Bell family pay for everything? Put in the cost of cabins and food, too. $76.35

6. On the last day they started out at 8:15 A.M. and reached Grand Lake 5 hr. later. At what time did they reach Grand Lake? 1:15 P.M.



Provide review of multiplication and division.

Review Practice

Multiply or divide. Check your work:

1.	95 × 137	13,015	5824 ÷ 7	832	7 × 3127	21,889
2.	77 × 845	65,065	1539 ÷ 2	769R1	4 × 6843	27,372
3.	19 × 650	12,350	6440 ÷ 8	805	6 × 1867	11,202
4.	36 × 243	8748	1851 ÷ 5	370R1	9 × 8492	76,428
5.	28 × 915	25,620	4415 ÷ 9	490R5	5 × 2965	14,825
6.	64 × 590	37,760	1927 ÷ 3	642R1	8 × 3204	25,632
7.	40 × 721	28,840	4236 ÷ 6	706	2 × 7326	14,652
8.	83 × 687	57,021	2336 ÷ 4	584	3 × 1059	3177
9.	52 × 408	21,216	3976 ÷ 8	497	7 × 6090	42,630

More Practice. See ㊱ on page 325. Use to reinforce skills.

Do You Know the Right Word?

Present review of some arithmetic vocabulary words.

10. You add 7, 9, and 2 and divide the sum by 3. Your answer is the . . . average of the numbers.

11. You divide 1750 by 5. Your answer is called the . . . quotient.

12. On paper draw a line around the cap of a milk bottle. You have made a . . . circle.

13. The corners of a square are . . . right angles.

14. 36 × 189 is a . . . multiplication example; 1785 ÷ 5 is a . . . division example.

15. Numbers like $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$ are called . . . fractions.

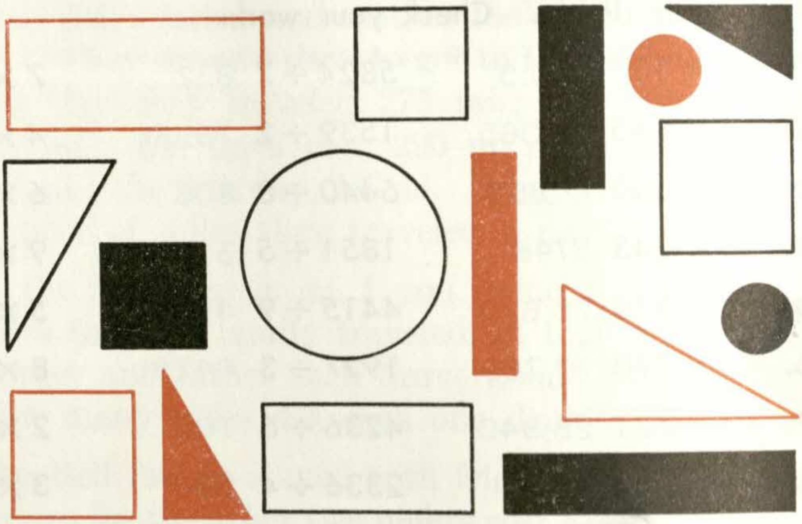
16. Eggs are usually sold by the . . . dozen.

17. You divide 16 by 5, and 1 is left over. The 1 is called the . . . remainder.

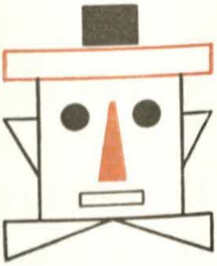
Let more advanced pupils omit ex. 1-9 and proceed directly to ex. 10-17. Have slower pupils do computations orally; in particular, multiplication by 2-place numbers, to check understandings.

Reinforce and extend understandings of geometric figures.

Figures You Should Know



1. Look at the figures above. Count all the circles. How many circles are there? 3 How many squares do you see? 4 How many rectangles can you find? 5 How many triangles are there? 4



2. Ann made a funny head, using only squares, circles, triangles, and rectangles. Look at the picture of the head Ann made and tell how many figures of each kind there are.
1 square; 2 circles; 5 triangles; 3 rectangles

3. Try to draw a head or an animal by using only these four different figures. Use as many of each kind as you need. Let various pupils display work, and have others tell what figures were used.

4. Bring to school a clean cap from a milk bottle. Place it on paper and draw around it carefully. What figure have you drawn? Make six of these figures and use them for clock faces. Make the six clocks show 8:00, 7:30, 4:15, 9:45, 6:20, 10:05.

Use flash cards (made for page 247) to review figures and names. In ex. 3, have pupils make heads or animals using figures cut out from colored construction paper. Post on bulletin board.

Problems without Numbers

Tell whether you add, subtract, multiply, or divide to work each problem. If there are two steps, give two answers:

1. Patty knows how many ounces a candy bar weighs. How can she find how many of these candy bars together weigh one pound? Divide

2. Fred knows the number of newspapers he sold each school day last week. How can he find the average number of papers he sold a day? Add; divide

3. Jane knows the number of school busses that carried the children to a picnic. She knows that each bus took the same number and what that number is. How can she find the number of children in all? Multiply

4. Ben knows the cost of making one tie holder and the price he can get for one. How can he find how much money he can make on several tie holders? Subtract; multiply

5. Betty knows how many children there are in each room in her school. How can Betty find how many children there are in the whole school? Add

6. John knows how many pounds he weighed last year at this time. He was weighed again today. How can John find how many more or fewer pounds he weighs now than he did last year? Subtract

7. Sally knows the cost of each thing she bought at the store. She also knows the amount of money she had. How can she find how much she should have left? Add; subtract

8. Mother knows how many pieces she can cut from one cake. How can she find how many pieces she can cut from several of these cakes? Multiply

Since this is the last activity of this type, urge all pupils to do ex. 1-8. Then discuss answers with pupils, having them give reasons for process (or processes) selected. See pages 62, 115, 139, and 223 for other suggestions.

Provide word problems for completion.

What Question Should You Ask?

You are to finish these problems. Make up a good question for each one. Use all the numbers in each problem. Then work the problem:

1. For the school party, the girls made 48 egg sandwiches and 36 chicken sandwiches.

▶ You can make an addition problem by asking, "How many sandwiches did they make all together?" A question for a subtraction problem could be, "How many more egg sandwiches than chicken sandwiches did they make?"

2. Cookies cost \$.60 a pound. Mother bought $\frac{1}{2}$ lb.

3. Bill saved \$1.25. He spent \$.89 for a book.

4. In a game Jim got these points: 6, 8, 15, 10, 11.

5. A dozen eggs cost \$.59. Mother bought 3 doz. eggs.

6. Fred paid 25¢ for pencils at 5¢ apiece.

7. A bird costs \$4.75. A cage costs \$3.95.

8. Jack had 100 stamps. He shared them equally with Jim, Bill, and Tom.

9. Ann earned \$.65. Her father gave her \$.75 and her mother gave her \$.50.

10. Betty went to the park with \$.50. After she bought a balloon she had \$.35 left.

11. John looked at suits. He saw one for \$12.95 and another for \$15.00.

12. Bill had \$.55 in his pocket. Then he and Fred earned \$3.00. They shared this money equally.

13. Peggy has 35 large buttons and 62 small buttons.

Urge pupils to use as many different thought patterns as possible. Have different pupils read their questions for same examples. Then have class solve them.

Oral Problems and Practice

1. Fred spent 7¢, 9¢, 2¢, 8¢, and 6¢. How much did he spend all together? 32¢

2. Ann had a quarter. She spent a nickel and a dime. How much did she have left? 10¢

3. Jim bought 30 marbles. He shared them equally with Bill and Dick. How many did each boy get? 10

Add 5 to each number;(1) add 7;(2) add 8;(3) add 10:(4)

(1),(2) 23,25 59,61 97,99 65,67 76,78 51,53 92,94 40,42
(3) **4.** 18 26 54 62 92 100 60 68 71 79 46 54 87 95 35 43
81,83 54,56 32,34 100,102 94,96 58,60 73,75 36,38
5. 76 84 49 57 27 35 95 103 89 97 53 61 68 76 31 39
(4) Ex. 4: 28, 64, 102, 70, 81, 56, 97, 45; ex. 5: 86, 59, 37, 105, 99, 63, 78, 41

Subtract 5 from each number;(1) subtract 9;(2) subtract 10:(3)

(1),(2) 70,66 85,81 31,27 59,55 14,10 47,43 36,32 81,77
(3) **6.** 75 65 90 80 36 26 64 54 19 9 52 42 41 31 86 76
33,29 38,34 18,14 12,8 84,80 55,51 90,86 67,63
7. 38 28 43 33 23 13 17 7 89 79 60 50 95 85 72 62

8. Ann pays 10¢ to ride on the bus. How much does she pay to ride 4 times? 40¢ to ride 8 times? 80¢ 10 times? $1.00

9. On 4 days Bob worked for Mr. King 2 hr., 4 hr., 3 hr., and 3 hr. What was the average number of hours Bob worked a day? 3 hr.

Multiply each number by 2;(1) by 10;(2) by 20:(3)

(1),(2) 28,140 30,150 40,200 82,410 64,320 46,230 48,240 86,430
(3) **10.** 14 280 15 300 20 400 41 820 32 640 23 460 24 480 43 860
44,220 68,340 24,120 66,330 88,440 80,400 26,130 42,210
11. 22 440 34 680 12 240 33 660 44 880 40 800 13 260 21 420

Divide each number by 2;(1) by 4:(2)

(1) 12 20 14 100 241 60 201
12. 24 (2) 6 40 10 28 7 200 50 482 120R2 120 30 402 100R2
40 24 22 64 122 82 104
13. 80 20 48 12 44 11 128 32 244 61 164 41 208 52

This review could be given as a quiz program or contest with class divided into teams. Note difficulties caused by adding or subtracting by endings, multiplying by tens, dividing by 2 and 4.

Problems with Measures

1. Father sold 350 gal. of milk last week. How many quarts of milk was that? 1400

2. Last week Father took 1520 half-pint bottles of milk to the schools. How many quarts of milk were in these half-pint bottles? 380

3. Jim went to the station to meet the 6:55 bus. It did not come until 7:32. How many minutes late was that bus? 37

4. Mr. Hill's new truck carries 24 boxes, each weighing 75 lb. Does the truck carry more or less than $\frac{1}{2}$ T.? How much more or less? 1800 lb.; more; 800 lb.

5. Ann is 47 in. tall. Her mother is 5 ft. 3 in. tall. How many inches taller than Ann is Ann's mother? 16

6. Susan made 150 cookies to sell. She put $\frac{1}{2}$ doz. in each package and sold the packages for $.23 each. How much did Susan get for the cookies? $5.75

7. Patty has made a dress and a coat for her doll. She needed 9 in. of cloth for the coat and 8 in. more of the same cloth for the dress. Did she have to buy $\frac{1}{4}$ yd., $\frac{1}{3}$ yd., or $\frac{1}{2}$ yd. of the cloth? 17 in.; $\frac{1}{2}$ yd.

8. Patty bought $\frac{1}{3}$ doz. red buttons and $\frac{1}{4}$ doz. black buttons for the doll's dress and coat. How many buttons of each kind did she get? 4 red; 3 black How many buttons in all is that? 7

Have pupils estimate answers first, then compute to get exact answers. Stress fact that all answers should be labeled. Group pupils who need further review of measures and equivalences.

Review basic skills (page 271), fractions (page 272), and measures (page 273).

How Well Can You Add and Subtract?

Copy in columns, add, and check:

1. 85 + 34 + 67 + 85 + 33 304 497 + 509 + 789 + 513 2308

2. 45 + 47 + 85 + 36 + 46 259 699 + 233 + 888 + 147 1967

3. 96 + 24 + 63 + 48 + 13 244 693 + 962 + 176 + 359 2190

4. 63 + 55 + 79 + 67 + 22 286 760 + 124 + 432 + 177 1493

5. Find the sum of \$66.03, \$84.10, and \$33.85. \$183.98

6. Add these numbers: 15, 36, 74, 88, 50, 37. 300

7. How many are 77¢ + 81¢ + 49¢ + 95¢? \$3.02

95 134 138 152 111 100
8. Add 76 to each number: 19, 58, 62, 76, 35, 24.

689 413 521 1000
9. Add 238 to each number: 451, 175, 283, 762.

Subtract the second number from the first one. Check:

10. 480, 260 220 1563, 986 577 6295, 1382 4913

11. 832, 274 558 1441, 896 545 8000, 4357 3643

12. 974, 587 387 1200, 365 835 7062, 5935 1127

13. 400, 273 127 1168, 669 499 8070, 5274 2796

14. Find the difference between 6512 and 7600. 1088

15. Subtract 788 from 957; 169 ↓ from 822; 34 ↓ from 1073. 285

16. How much larger is 6936 than 2356? 4580

17. From 900 take 498; 402 ↓ from 756 take 459. 297

18. Subtract 436 from each of these numbers:

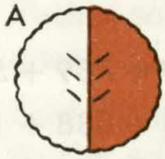
633 197 855 419 691 255 920 484 684 248 518 82

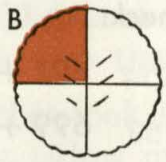
812 376 454 18 769 333 526 90 800 364 557 121

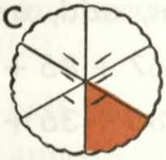
More Practice. See ㊲ on page 326.

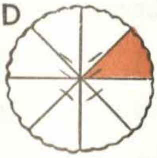
Have pupils work independently. Note evidences of frustration or hesitancy. Group pupils for further review using "More Practice" pages. Let others work on arithmetic scrapbooks or at arithmetic corner.

Reviewing Fractions

A


B


C


D


1. Look at the 4 pies above. You see they are all the same size. What part of pie A is one piece? One half What part of pie B is one piece? One fourth What part of pie C is one piece? One sixth What part of pie D is one piece? One eighth

2. Which pie above has the largest pieces? A the smallest? D

Tell the missing numbers:

3. 1 whole pie equals 6 . . sixths of the pie. $1 = \frac{?}{6}$ 6

4. 1 whole pie equals 2 . . halves of the pie. $1 = \frac{?}{2}$ 2

5. 1 whole pie equals 8 . . eighths of the pie. $1 = \frac{?}{8}$ 8

6. 1 whole pie equals 4 . . fourths of the pie. $1 = \frac{?}{4}$ 4

7. Which piece would be larger,

(a) $\frac{1}{4}$ of a pie or $\frac{3}{4}$ of a pie? $\frac{3}{4}$
(b) $\frac{1}{8}$ of a pie or $\frac{1}{2}$ of a pie? $\frac{1}{2}$
(c) $\frac{1}{4}$ of a pie or $\frac{1}{6}$ of a pie? $\frac{1}{4}$

8. Look at pie D. Then show that $\frac{1}{4} = \frac{2}{8}$; also that $\frac{1}{2} = \frac{2}{4}$; that $\frac{6}{8} = \frac{3}{4}$; that $\frac{1}{2} = \frac{4}{8}$.

9. Write in figures:
three fourths $\frac{3}{4}$ one quarter $\frac{1}{4}$ two halves $\frac{2}{2}$
five sixths $\frac{5}{6}$ five eighths $\frac{5}{8}$ seven eighths $\frac{7}{8}$

10. Write these fractions in order. First write the largest, then the next largest, and so on to the smallest: $\frac{1}{5}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{2}$, $\frac{1}{9}$, $\frac{1}{3}$, $\frac{1}{7}$. $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, $\frac{1}{9}$

Again, have pupils work independently. Check lack of understanding. Pupils should have complete mastery of fractions and equivalents before beginning work in addition of fractions. Use materials in reteaching.

Showing What You Know

Copy and follow the signs. Check your work:

1. $$\begin{array}{r} 67 \\ 73 \\ 96 \\ 28 \\ +59 \\ \hline 323 \end{array}$$

2. $$\begin{array}{r} 1429 \\ -854 \\ \hline 575 \end{array}$$

3. $$\begin{array}{r} 6000 \\ -4265 \\ \hline 1735 \end{array}$$

4. $$\begin{array}{r} 3218 \\ \times 6 \\ \hline 19{,}308 \end{array}$$

5. $$\begin{array}{r} 457 \\ \times 32 \\ \hline 14{,}624 \end{array}$$

6. 168 ÷ 8 21

7. 4186 ÷ 7 598

8. $\begin{array}{r} 504 \\ 6\overline{)3024} \end{array}$

9. $\frac{1}{5}$ of 345 69

10. 247 + 906 + 325 + 826 2304

11. 5000 ÷ 9 555 R5

12. $\frac{1}{4}$ of 96¢ 24¢

13. 48 × 507 24,336

14. How many seconds are there in 3 min.? 180

15. How many ounces are there in $\frac{1}{4}$ lb.? 4

16. How many feet are there in 16 yd.? 48

17. Find the average of 16, 28, and 19. 21

18. Write the Roman numerals for $\overset{\text{VI}}{6}$, $\underset{\text{XIV}}{14}$, $\overset{\text{XXV}}{25}$, $\underset{\text{XXIX}}{29}$.

19. Find the difference between \$25.00 and \$16.75. \$8.25

20. Estimate the cost of 6 books at \$1.98 each. \$12.00

21. How many oranges are there in 6 doz. oranges? 72

22. How many 7-cent stamps can I buy for \$3.15? 45

23. Find the sum of 35¢, 82¢, 43¢, 19¢, and 37¢. \$2.16

24. How many pounds are there in half a ton? 1000

25. How many yards are there in 234 ft.? 78

This is a test to show what you have learned. Each right answer counts 4 for you.

`Results of these reviews (pages 271-273) should be noted on progress cards and used to evaluate achievement. Drill or reteach as needed.`

See G-94 for correlation of examples with aims.

Chapter Review

1. Name two things sold by the quart and two things sold by the gallon.

2. Name one thing sold by the ton, one thing sold by the pound, and one sold by the ounce.

3. Write the abbreviation for pint, quart, gallon, ounce, pound, ton, mile.
pt. qt. gal. oz. lb. T. mi.

4. Name the shape of these things: a door; rectangle a wheel; circle a figure with 3 sides; triangle a figure with 4 equal sides and 4 right angles. square

5. How many pounds are there in a ton? 2000 in $\frac{1}{4}$ T.? 500

6. How many rolls are there in 4 doz. rolls? 48

7. Find the average of 131, 150, and 142. 141

8. Three boys went camping. It cost them $29.85 all together. Estimate the cost for each boy. $10.00

Multiply. Check your work by going over it:

9.	6538 8 52,304	2694 5 13,470	4259 3 12,777	$35.90 6 $215.40	$75.42 9 $678.78
10.	3167 4 12,668	7128 7 49,896	8063 9 72,567	$17.58 5 $87.90	$97.14 8 $777.12

Divide. Check your work by multiplying:

11.	705R3 4)2823	320R7 9)2887	427 6)2562	900 8)7200	604 3)1812
12.	387R1 7)2710	908 5)4540	765 2)1530	905 6)5430	500R5 9)4505
13.	890 4)3560	307R4 8)2460	817 9)7353	400R6 7)2806	370R2 5)1852

Note results on progress cards. After checking papers, help pupils to discover causes of errors. Give further practice or review as needed.

Each problem on the test counts 10. Try to get all the problems right. Check your work.

1. In 3 days Father drove 285 mi., 325 mi., and 335 mi. Find the average number of miles he drove a day. 315
2. Which costs less and how much less, a case of 12 cans of dog food for $2.00 or 12 cans at $.19 a can? 12 cans at $2.00; $.28 less
3. There are 583 children in Park School. All together there are 289 girls. How many boys are there? 294
4. Last week Tom sold these dozens of eggs: 6, 5, 8, 4, 7, 6. He got $.59 a dozen for them. How much money did Tom get for eggs last week? $21.24
5. Ann went to the store with $5.00. She bought 125 three-cent balloons for the school picnic. How much change did Ann get? $1.25
6. Jim's father sold 6 radios for $59.95 each. How much did he get for all the radios? $359.70
7. For the school picnic we bought 7 doz. paper plates. All but 9 of them were used. How many paper plates did we use for the picnic? 75
8. On Saturday Joe sold 9 doz. roses for his father. He got $27.81 for them. What was the price of 1 doz.? $3.09
9. Peggy spent $3.50 for cloth, $.89 for ribbon, and $.15 for pins. Then she had $1.08 left. How much did Peggy have before she went to the store? $5.62
10. Bill's change when he bought a movie ticket was 1 quarter, 3 dimes, and 2 nickels. How much change did Bill get all together? 65¢

Urge pupils to read problems carefully to determine process (or processes) to use. Remind them to watch for hidden questions. Discuss answers with pupils, having them give reasons for process used.

Provide diagnostic test of skills taught.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Page for that row.

Multiply and check:

					Practice Pages
1.	267 29 7743	503 83 41,749	819 45 36,855	347 71 24,637	225
2.	621 70 43,470	458 20 9160	390 90 35,100	275 60 16,500	224
3.	2407 8 19,256	3257 4 13,028	6193 6 37,158	5814 9 52,326	245

Find the average of these numbers:

4.	37, 53, 46, 60, 29 45	386, 250 318	254
5.	784, 697, 549, 654 671	609, 475 542	254

Divide and check:

6.	$\begin{array}{r}635\\7\overline{)4445}\end{array}$	$\begin{array}{r}948\\3\overline{)2844}\end{array}$	$\begin{array}{r}279\\6\overline{)1674}\end{array}$	$\begin{array}{r}375\\8\overline{)3000}\end{array}$	244
7.	$\begin{array}{r}507\\4\overline{)2028}\end{array}$	$\begin{array}{r}802\text{R2}\\9\overline{)7220}\end{array}$	$\begin{array}{r}306\\5\overline{)1530}\end{array}$	$\begin{array}{r}807\text{R1}\\7\overline{)5650}\end{array}$	256
8.	$\begin{array}{r}860\\6\overline{)5160}\end{array}$	$\begin{array}{r}500\text{R7}\\8\overline{)4007}\end{array}$	$\begin{array}{r}970\text{R1}\\2\overline{)1941}\end{array}$	$\begin{array}{r}700\\9\overline{)6300}\end{array}$	258

Find the answers:

9.	$\frac{1}{5}$ of 2515 503	$\frac{1}{9}$ of 2772 308	256
10.	$\frac{1}{6}$ of 3624 604	$\frac{1}{8}$ of 4816 602	256
11.	$\frac{1}{8}$ of 6000 750	$\frac{1}{6}$ of 3000 500	258
12.	$\frac{1}{7}$ of 4900 700	$\frac{1}{9}$ of 8190 910	258

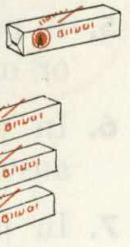
Compare results of test with previous ones as noted on progress cards. Urge pupils to make self-assignments from practice pages, but be sure they understand causes of original errors.

See G-96 for specific aims of Chapter 8.

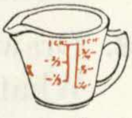
Chapter 8

Fractions in Cooking

Develop readiness to add like fractions.



1. The girls need $\frac{1}{4}$ lb. of butter to make candy and $\frac{3}{4}$ lb. of butter for cookies and cake. How many pounds of butter do they need? 1 1 fourth and 3 fourths are how many fourths? 4 What does $\frac{4}{4}$ equal? 1 You can write the work like this: $\frac{1}{4} + \frac{3}{4} = \frac{4}{4}$ or 1.



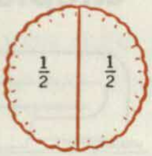
2. For the cookies they will use $\frac{1}{2}$ cup of brown sugar and $\frac{1}{2}$ cup of white sugar. How much sugar is this? 1 cup How much is $\frac{1}{2}$ cup + $\frac{1}{2}$ cup? 1 cup Write the work like this: $\frac{1}{2} + \frac{1}{2} = \ldots 1$.

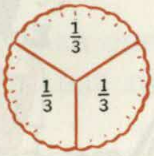
3. The girls will put $\frac{2}{3}$ cup of nuts in the cookies and $\frac{1}{3}$ cup of nuts on the top of the cake. How many cups of nuts will they need? 1 $\frac{2}{3} + \frac{1}{3} = \ldots 1$.

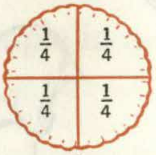
Follow development as given on this page, stressing use of fractions in everyday life. Through questions about ex. 2–3, reinforce concept that $\frac{1}{2}$ cup is larger than $\frac{1}{3}$ cup. Have pupils bring in other recipes and compare fractional amounts used.

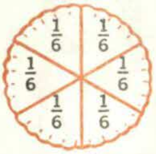
Extend teaching of adding like fractions.

Studying Fractions


A


B


C


D

1. Look at pie A. How many equal pieces are there? 2 Does one half pie and one half pie equal one whole pie? Yes Does 1 half + 1 half = 1 whole? Yes

2. Look at pie B. Does 1 third + 1 third = 2 thirds? Yes Does 1 third + 1 third + 1 third = 1 whole? Yes

3. In pie C, how much is 1 fourth + 1 fourth? You see there are two answers. 1 fourth + 1 fourth = 2 fourths or 1 fourth + 1 fourth = 1 half. This shows that 2 fourths = 1 half. $\frac{2}{4} = \frac{1}{2}$.

4. In pie C, how much is $\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$? $\frac{3}{4}$ Does $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$? Yes Does $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$? Yes Does $\frac{3}{4} + \frac{1}{4} = 1$? Yes

5. In pie D, how much is $\frac{1}{6} + \frac{1}{6}$? $\frac{2}{6}$ Are there two answers or only one? 2 Show that $\frac{2}{6} = \frac{1}{3}$.

6. In pie D, how much is $\frac{1}{6} + \frac{1}{6} + \frac{1}{6}$? $\frac{3}{6}$ How many answers are there? 2 $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} = .\frac{3}{6}.$ or $.\frac{1}{2}.$

7. In pie D, how much is $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$? $\frac{5}{6}$ How much is $\frac{3}{6} + \frac{1}{6} + \frac{1}{6}$? $\frac{5}{6}$ How much is $\frac{3}{6} + \frac{2}{6}$? $\frac{5}{6}$

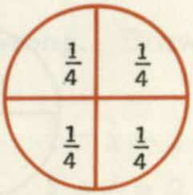
8. Draw a pie on paper and divide it into 8 equal parts. What is the name of each part? One eighth Make up some examples about adding eighths, like the examples in ex. 5–7 above. Try to find one example that has three answers. $\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$

9. On the blackboard write all the different examples that the class found for ex. 8. How many are there?

Use flannelboard with fractional parts to demonstrate in ex. 1-7. Have pupils use own fractional kits (whole circles and fractional parts) to show the additions and discover equivalences. Do not hurry this lesson. Be sure pupils have good understanding before proceeding.

Extend teaching of fractions to abstract figures.

More about Fractions



Look at the circle at the right to find the answers. Tell what goes in each space:

1. 1 fourth + 1 fourth = . 2 . fourths
$\frac{1}{4}+\frac{1}{4}= .\frac{2}{4}.$

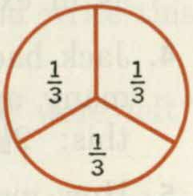
2. $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}= .\frac{3}{4}.$ $\frac{2}{4}+\frac{1}{4}= .\frac{3}{4}.$

3. $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}= .\frac{4}{4}.$ or . 1 .
$\frac{3}{4}+\frac{1}{4}= .\frac{4}{4}.$ or . 1 .

4. $\frac{4}{4}=1$, so $\frac{4}{4}-\frac{1}{4}= .\frac{3}{4}.$ and $1-\frac{1}{4}= .\frac{3}{4}.$
$\frac{4}{4}=1$, so $\frac{4}{4}-\frac{2}{4}= .\frac{2}{4}.$ and $1-\frac{2}{4}= .\frac{2}{4}.$
$\frac{4}{4}=1$, so $\frac{4}{4}-\frac{3}{4}= .\frac{1}{4}.$ and $1-\frac{3}{4}= .\frac{1}{4}.$

5. Look at the circle above. Does $\frac{4}{4}-\frac{2}{4}=\frac{1}{2}$? Yes Does $1-\frac{2}{4}=\frac{1}{2}$? Yes

6. Look at the circle at the right. Does $\frac{1}{3}+\frac{1}{3}=\frac{2}{3}$? Yes Does $\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=1$? Yes Does $1-\frac{1}{3}=\frac{2}{3}$? Yes Does $1-\frac{2}{3}=\frac{1}{3}$? Yes



Write these with fractions:

7. 1 fourth + 1 fourth = 2 fourths. $\frac{1}{4}+\frac{1}{4}=\frac{2}{4}$

8. 3 fourths + 1 fourth = 4 fourths. $\frac{3}{4}+\frac{1}{4}=\frac{4}{4}$

9. 3 thirds − 1 third = 2 thirds. $\frac{3}{3}-\frac{1}{3}=\frac{2}{3}$

10. 1 half + 1 fourth = 3 fourths. $\frac{1}{2}+\frac{1}{4}=\frac{3}{4}$

11. 1 third + 2 thirds = 3 thirds or 1. $\frac{1}{3}+\frac{2}{3}=\frac{3}{3}$ or 1

12. 1 fourth + 1 fourth = 1 half. $\frac{1}{4}+\frac{1}{4}=\frac{1}{2}$

13. four fourths − 2 fourths = 1 half. $\frac{4}{4}-\frac{2}{4}=\frac{1}{2}$

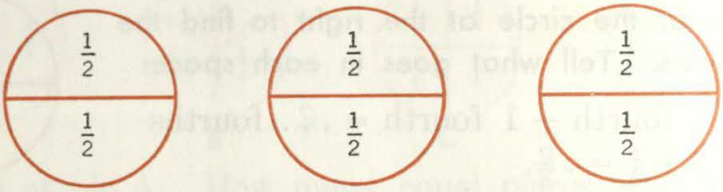
14. two halves − 1 half = 1 half. $\frac{2}{2}-\frac{1}{2}=\frac{1}{2}$

15. 3 fourths − 2 fourths = 1 fourth. $\frac{3}{4}-\frac{2}{4}=\frac{1}{4}$

Have pupils do most of this work with pencil and paper (not using fractional parts). Let them prove answers by using flannelboard. Have pupils illustrate ex. 7–15 with cutouts of parts pasted on paper.

Extend addition of like fractions to sums greater than 1 (pages 280–281).

Studying Fractions



1. In each circle above you see that two halves of a circle make one whole circle. You can write it like this: $\frac{1}{2} + \frac{1}{2} = \frac{2}{2}$ or 1.

2. How many halves are there in 2 whole circles? You see that 4 halves make 2 whole circles. Here is the way to write it: $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$.

3. Look at all three circles above. How many halves are there in 3 whole circles? 6 Write this in figures as in ex. 2. $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 3$

4. Jack had 2 apples and half of another apple. How many apples did he have? You can write it like this: $2\frac{1}{2}$ apples.

5. How many apples are 4 apples and half of another apple? Write the answer a short way.
$4\frac{1}{2}$ apples

Tell which answers are right and which are wrong. Look at the circles above if you need to:

6. $1 + \frac{1}{2} + \frac{1}{2} = 2$ Right $1 + \frac{1}{2} + 1 = 1\frac{1}{2}$ Wrong

7. $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}$ Right $\frac{1}{2} + 1 + \frac{1}{2} = 2$ Right

8. $2 + \frac{1}{2} + \frac{1}{2} = 3$ Right $\frac{2}{2} + \frac{1}{2} + 1 = 2\frac{1}{2}$ Right

9. $\frac{1}{2} + \frac{2}{2} + \frac{1}{2} = 2\frac{1}{2}$ Wrong $\frac{2}{2} + \frac{2}{2} + \frac{2}{2} = 3$ Right

10. $1 + \frac{1}{2} + \frac{2}{2} = 3$ Wrong $1 + 1 + \frac{1}{2} = 2\frac{1}{2}$ Right

11. $1 + \frac{2}{2} + \frac{2}{2} = 3$ Right $\frac{1}{2} + \frac{1}{2} + 1 = 3$ Wrong

Use flannelboard and fractional parts to illustrate problems. Let pupils use fractional kits (if needed) to do ex. 6–11. Main purpose of lessons is to show need and possibility of computation with fractions.

Urge pupils to complete exercises without use of objects.

Studying Fractions

Tell which answers are right and which are wrong. Draw circles if you need help: Prove on flannelboard.

1. $\frac{1}{2} + \frac{1}{2} = 1$ Right $\frac{2}{4} - \frac{1}{4} = \frac{1}{4}$ Right $\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$ Right

2. $1 + \frac{1}{2} = 1\frac{1}{2}$ Right $3 - \frac{1}{2} = 2$ Wrong $\frac{2}{2} + \frac{2}{2} = 2$ Right

3. $\frac{1}{4} + \frac{2}{4} = 1$ Wrong $5 + \frac{1}{4} = 5\frac{1}{4}$ Right $1 - \frac{1}{4} = \frac{3}{4}$ Right

4. $\frac{3}{4} + 1 = 1\frac{3}{4}$ Right $\frac{4}{4} - \frac{3}{4} = \frac{1}{4}$ Right $1 + \frac{1}{4} = 1\frac{1}{4}$ Right

5. $\frac{3}{4} - \frac{1}{4} = \frac{1}{2}$ Right $2 - \frac{1}{2} = 2\frac{1}{2}$ Wrong $1 - \frac{1}{2} = \frac{1}{2}$ Right

Draw circles and divide them into equal parts if you need help with these problems:

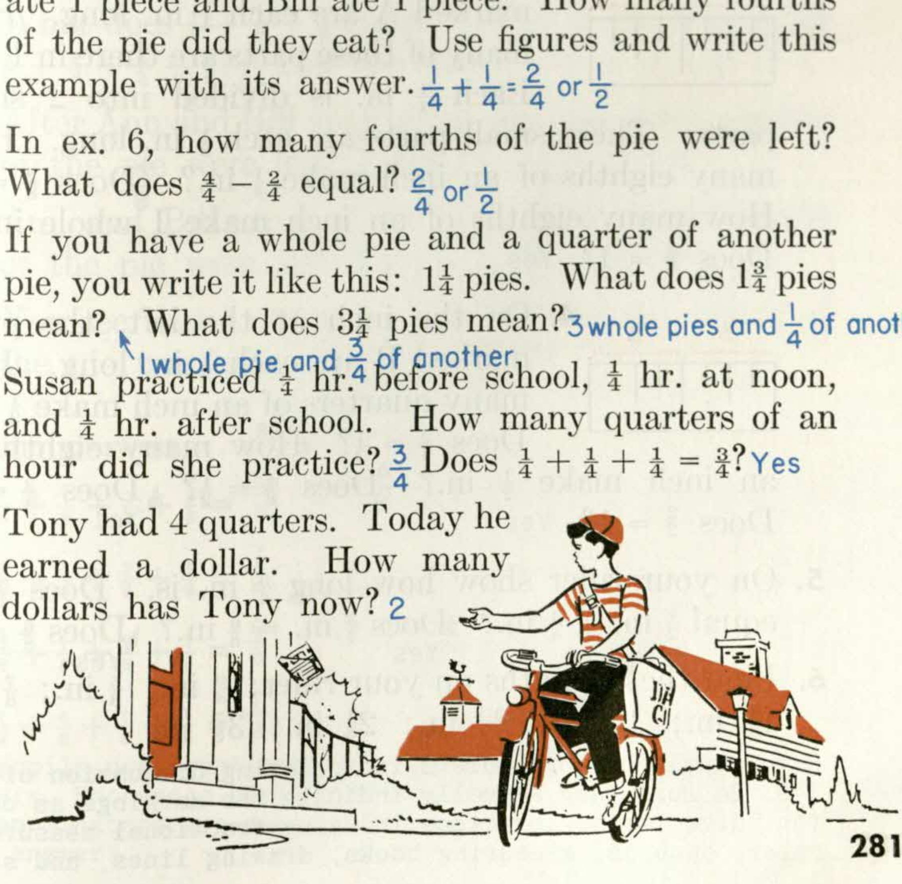
6. Mother made a pie and cut it into fourths. Ann ate 1 piece and Bill ate 1 piece. How many fourths of the pie did they eat? Use figures and write this example with its answer. $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$ or $\frac{1}{2}$

7. In ex. 6, how many fourths of the pie were left? What does $\frac{4}{4} - \frac{2}{4}$ equal? $\frac{2}{4}$ or $\frac{1}{2}$

8. If you have a whole pie and a quarter of another pie, you write it like this: $1\frac{1}{4}$ pies. What does $1\frac{3}{4}$ pies mean? 1 whole pie and $\frac{3}{4}$ of another What does $3\frac{1}{4}$ pies mean? 3 whole pies and $\frac{1}{4}$ of another

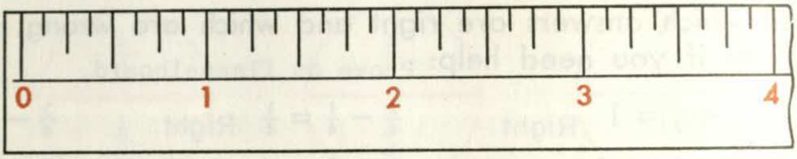
9. Susan practiced $\frac{1}{4}$ hr. before school, $\frac{1}{4}$ hr. at noon, and $\frac{1}{4}$ hr. after school. How many quarters of an hour did she practice? $\frac{3}{4}$ Does $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$? Yes

10. Tony had 4 quarters. Today he earned a dollar. How many dollars has Tony now? 2



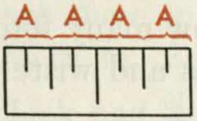
Use ruler to increase understanding of fractions.

Fractions on a Ruler

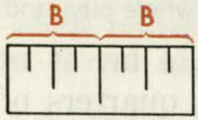


1. The picture above shows 4 inches of a ruler. The length from 0 to 1 is 1 in. What is the length from 0 to 2? 2 in. from 0 to 3? 3 in. from 0 to 4? 4 in.

2. The little marks between 0 and 1 are parts of an inch, or fractions of an inch. Can you find the mark that shows $\frac{1}{2}$ in.? Can you find the mark that shows $\frac{1}{4}$ in.? What does the first short mark show? $\frac{1}{8}$ in.



3. At the left you see 1 inch. The parts marked A are each $\frac{1}{4}$ in. long. How many of these parts are there in 1 in.? 4 Each $\frac{1}{4}$ in. is divided into 2 small parts. These small parts are each $\frac{1}{8}$ in. long. How many eighths of an inch make $\frac{1}{4}$ in.? $\frac{2}{8}$ Does $\frac{2}{8} = \frac{1}{4}$? Yes How many eighths of an inch make 1 whole inch? $\frac{8}{8}$ Does $\frac{8}{8} = 1$? Yes



4. On the inch at the left, the parts marked B are each $\frac{1}{2}$ in. long. How many quarters of an inch make $\frac{1}{2}$ in.? $\frac{2}{4}$ Does $\frac{2}{4} = \frac{1}{2}$? Yes How many eighths of an inch make $\frac{1}{2}$ in.? $\frac{4}{8}$ Does $\frac{4}{8} = \frac{1}{2}$? Yes Does $\frac{2}{4} = \frac{4}{8}$? Yes Does $\frac{2}{2} = 1$? Yes

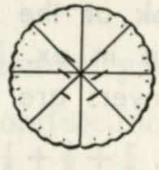
5. On your ruler show how long $\frac{3}{4}$ in. is. Does $\frac{3}{4}$ in. equal $\frac{1}{2}$ in. + $\frac{1}{4}$ in.? Yes Does $\frac{3}{4}$ in. = $\frac{6}{8}$ in.? Yes Does $\frac{6}{8} = \frac{3}{4}$? Yes

6. Find these lengths on your ruler: $\frac{3}{8}$ in.; $\frac{5}{8}$ in.; $\frac{7}{8}$ in.; $1\frac{1}{4}$ in.; $1\frac{1}{2}$ in.; $2\frac{3}{4}$ in.; $2\frac{1}{8}$ in.; $3\frac{3}{8}$ in.

Have pupils use own rulers in following discussion of ex. 1–6. Be sure they actually indicate the markings as called for. Give further practice in using fractional measures on ruler, such as, measuring books, drawing lines, and so on.

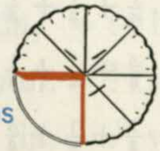
Teach how to add and subtract fractions (eighths).

Studying Eighths



1. Mother cut a pie into 8 equal parts. What do you call 1 part of the pie? $\frac{1}{8}$ What do you call 2 parts of the pie? $\frac{2}{8}$ 3 parts? $\frac{3}{8}$ 5 parts? $\frac{5}{8}$ 7 parts? $\frac{7}{8}$

2. How many eighths are there in the whole pie? $\frac{8}{8}$ You can write it like this: $\frac{8}{8} = 1$. You can add 8 eighths like this: $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{8}{8}$.



3. Ann and Bill each ate $\frac{1}{8}$ of the pie. Together they ate $\frac{2}{8}$ of the pie. So $\frac{1}{8} + \frac{1}{8} = \frac{2}{8}$. Ann said that Bill and she ate $\frac{1}{4}$ of the pie. Is Ann right? Yes Does $\frac{2}{8} = \frac{1}{4}$? Yes

4. What does $\frac{1}{8} + \frac{1}{8} + \frac{1}{8}$ equal? $\frac{3}{8}$ What is the answer for $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$? $\frac{4}{8}$ or $\frac{1}{2}$ You see that $\frac{4}{8} = \frac{1}{2}$ or $\frac{4}{8} = \frac{2}{4}$.

5. After Ann and Bill ate $\frac{2}{8}$ of the pie, how many eighths of the pie were left? $\frac{6}{8}$ Does $\frac{8}{8} - \frac{2}{8} = \frac{6}{8}$? Yes

6. Ann and Bill ate $\frac{1}{4}$ of the pie. How many fourths of the pie were left? $\frac{3}{4}$ Does $\frac{4}{4} - \frac{1}{4} = \frac{3}{4}$? Yes

7. You see that $\frac{6}{8}$ of the pie was left and also that $\frac{3}{4}$ of the pie was left. Does $\frac{6}{8} = \frac{3}{4}$? Yes

Tell the answers:

8. $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{5}{8} = \frac{8}{8}$ $\quad \frac{7}{8} - \frac{4}{8} = \frac{3}{8}$ $\quad \frac{1}{8} + \frac{1}{8} = \frac{2}{8}$

9. $\frac{2}{8} + \frac{1}{8} + \frac{3}{8} + \frac{1}{8} = \frac{7}{8}$ $\quad \frac{5}{8} - \frac{2}{8} = \frac{3}{8}$ $\quad \frac{7}{8} - \frac{2}{8} = \frac{5}{8}$

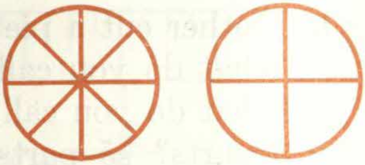
10. $\frac{3}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{6}{8}$ $\quad \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$ $\quad \frac{8}{8} - \frac{3}{8} = \frac{5}{8}$

11. $\frac{1}{8} + \frac{4}{8} + \frac{1}{8} + \frac{1}{8} = \frac{7}{8}$ $\quad \frac{3}{8} + \frac{4}{8} = \frac{7}{8}$ $\quad \frac{4}{8} + \frac{1}{8} = \frac{5}{8}$

Let pupils use fractional parts or rulers to discover answers. Encourage pupils to formulate rule for this work: if denominators are same, add or subtract numerators to find answer.

Provide further practice with fourths and eighths.

Fourths and Eighths



Look at the circles if you need help in ex. 1 to 9. Tell which answers are right:

1. $\frac{3}{8}+\frac{2}{8}+\frac{1}{8}=\frac{6}{8}$ Right
2. $\frac{3}{8}+\frac{1}{8}+\frac{4}{8}=1$ Right $\frac{6}{8}-\frac{3}{8}=\frac{2}{8}$ Wrong $\frac{6}{8}=\frac{3}{4}$ Right
3. $\frac{1}{8}+\frac{2}{8}+\frac{2}{8}=\frac{7}{8}$ Wrong $\frac{3}{4}+\frac{1}{4}=1$ Right $\frac{8}{8}=1$ Right
4. $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{4}{4}$ Wrong $\frac{4}{8}-\frac{2}{8}=\frac{1}{4}$ Right $\frac{3}{4}=\frac{4}{8}$ Wrong
5. $\frac{5}{8}+\frac{1}{8}+\frac{1}{8}=\frac{7}{8}$ Right $1-\frac{3}{4}=\frac{1}{4}$ Right $\frac{2}{4}=\frac{1}{2}$ Right
6. $\frac{2}{8}+\frac{1}{8}+\frac{4}{8}=\frac{6}{8}$ Wrong $\frac{6}{8}-\frac{2}{8}=\frac{1}{2}$ Right $\frac{1}{2}=\frac{4}{8}$ Right
7. $\frac{2}{4}+\frac{1}{4}+\frac{1}{4}=1$ Right $\frac{5}{8}-\frac{2}{8}=\frac{1}{8}$ Wrong $\frac{5}{8}=\frac{3}{4}$ Wrong
8. $\frac{1}{8}+\frac{1}{8}+\frac{3}{8}=\frac{5}{8}$ Right $\frac{3}{8}+\frac{2}{8}=\frac{5}{8}$ Right $1=\frac{4}{4}$ Right
9. $\frac{2}{8}+\frac{5}{8}+\frac{1}{8}=\frac{8}{8}$ Right $\frac{4}{8}+\frac{3}{8}=\frac{1}{8}$ Wrong $\frac{1}{2}=\frac{3}{4}$ Wrong

10. Ann bought $\frac{1}{4}$ yd. of green ribbon, $\frac{1}{4}$ yd. of red ribbon, and $\frac{1}{4}$ yd. of white ribbon. What part of a yard of ribbon did she buy all together? $\frac{3}{4}$
11. Tom bought $\frac{1}{2}$ lb. of peanuts and $\frac{1}{4}$ lb. of mixed nuts. What part of a pound of nuts did Tom have in all? $\frac{3}{4}$
12. Susan made 1 lb. of candy. She gave Mary $\frac{1}{4}$ lb. of it. What part of a pound did she have left? $\frac{3}{4}$
13. Mother bought $\frac{3}{8}$ yd. of blue ribbon and $\frac{3}{8}$ yd. of white ribbon. What part of a yard of ribbon did Mother buy all together? $\frac{6}{8}$
14. Dick bought $\frac{1}{4}$ lb. of hard candy and $\frac{1}{4}$ lb. of peanut candy. What part of a pound did Dick have in all? $\frac{2}{4}$ or $\frac{1}{2}$

Let slower pupils use rulers or fractional parts to determine answers. Have pupils make charts showing related fractions (halves, fourths, eighths; and halves, thirds, sixths).

Reteach abbreviations of measures and review simple equivalents.

Practice on Measures

Write the abbreviations for these measures:

1. inch in. pound lb. ton T. quart qt. dozen doz. yard yd.

2. pint pt. gallon gal. day da. ounce oz. second sec. foot ft.

3. week wk. minute min. mile mi. month mo. hour hr. year yr.

Find the number that goes in each space:

4. 1 hr. = .60. min. $\frac{1}{4}$ hr. = .15. min. $\frac{1}{2}$ gal. = .2. qt.

5. 8 qt. = .2. gal. $\frac{1}{2}$ hr. = .30. min. 1 da. = .24. hr.

6. 6 pt. = .3. qt. $\frac{1}{8}$ lb. = .2. oz. $\frac{1}{2}$ min. = .30. sec.

7. 4 wk. = .28. da. $\frac{1}{4}$ yd. = .9. in. 14 da. = .2. wk.

8. $\frac{1}{2}$ yr. = .6. mo. 1 mi. = .5280. ft. 18 ft. = .6. yd.

9. Saturday Bill went to a movie at 1:30 P.M. He came out at 3:50 P.M. How many hours and minutes was Bill at the movie? 2 hr. 20 min. Look at a clock if you need help to get the answer.

10. On May 6 Mary said, "My birthday is 3 weeks from today." What is the date of Mary's birthday? May 27

11. For a school party the girls made enough orange drink to fill 176 measuring cups. How many quarts of orange drink did they make? 44 How many gallons? 11

12. Ann needs 90 in. of ribbon for her hat and 54 in. of the same ribbon for her dress. Does she need to buy 2 yd., 3 yd., or 4 yd. of ribbon? 4

13. Jack was on a farm 3 da. in June, all of July and August, and 5 da. in September. How many weeks was Jack on a farm? 10

Compare "related" measures in ex. 1–3, asking which is larger, or longer. Group pupils who have difficulties in ex. 4–8 and review previous lessons on measures. Let others estimate measures of items in class.

Using Arithmetic Words

Show that you know the meaning of the words in each exercise. Use 36 and 6 in answering each question: Stress.

1. What is the sum of these numbers? 42

2. What is the product of these numbers? 216

3. What is the average of these two numbers? 21

4. What is the difference between these numbers? 30

5. Is there a remainder if you divide the larger number by the smaller number? No

6. Is the smaller number less than one third of the larger number? Yes

7. What is the quotient if the larger number is divided by the smaller one? 6

8. What is the remainder if you take the smaller number from the larger one? 30

Oral Practice

9. Give the answers to the multiplication facts on page 196 and to the division facts on page 198. (See answers for these pages)

10. Add 6 to each number; (1) add 8; (2) add 9: (3)

(1),(2) 60,62 89,91 35,37 82,84 43,45 21,23 54,56 66,68
(3) 54 63 83 92 29 38 76 85 37 46 15 24 48 57 60 69

Give the answers:

11. (8 × 7) + 6 62 7 + (9 × 6) 61 (8 × 4) + 7 39

12. (6 × 5) + 4 34 4 + (5 × 7) 39 (9 × 8) + 8 80

More Practice. See ㊳ on page 326.

Have pupils write answers to ex. 1-8. Note errors caused by lack of understanding of arithmetic terms and give further review as needed. Extend work in ex. 11-12 to include other multiplication facts.

Review the four fundamental operations.

Review Practice

Add and check the work:

1.	$35.84	$49.54	$79.42	$26.57	$56.83
	21.26	72.37	44.13	82.61	18.98
	30.72	18.86	16.89	67.00	78.53
	23.15	43.72	59.56	14.49	41.09
	$110.97	$184.49	$200.00	$190.67	$195.43

Subtract. Check the work by adding:

2.	$88.65	$97.52	$80.00	$48.19	$80.00
	39.38	59.86	25.87	38.66	47.96
	$49.27	$37.66	$54.13	$ 9.53	$32.04

Multiply or divide and check the work:

3. 8 × $19.75 $158.00 14 × $.69 $9.66 25 × $3.09 $77.25

4. 6 × $57.32 $343.92 73 × $.81 $59.13 90 × $6.37 $573.30

5. $33.40 ÷ 4 $8.35 $37.25 ÷ 5 $7.45 $18.48 ÷ 3 $6.16

6. $76.50 ÷ 9 $8.50 $35.76 ÷ 8 $4.47 $39.27 ÷ 6 $6.54 R3¢

Find the average:

7. 69, 83, 91, 63, 74 76 **8.** 743, 906, 865 838

Copy and find the answers. Watch the signs: Stress.

9.	6894	7333	9000	67	248
	×6	−4378	−7745	×57	×84
	41,364	2955	1255	3819	20,832

10. 7)4529 647 5)1704 340 R4 2)1452 726 9)6471 719 6)5442 907

11. 4799 + 7584 + 3664 16,047 565 + 896 + 576 + 829 2866

12. 95 × 154 14,630 7 × 4529 31,703 23 × 275 6325

Do not use as timed test. Allow sufficient time for all pupils to complete page. Observe work habits (hesitation, too rapid but inaccurate, and so on). Note information on progress cards for remedial summer programs.

Provide practice in finding averages

Practicing Music Lessons

1. Sally practiced 30 min. on Monday, 40 min. on Tuesday, 35 min. on Wednesday, 45 min. on Thursday, and 40 min. on Friday. Find the average number of minutes she practiced a day. 38

▶ This is a two-step problem because you first have to add the numbers to find how many minutes Sally practiced all together. Then you divide by 5 to find the average number of minutes she practiced a day.

2. Last week Sally practiced 135 min. in 3 da. On the average, how many minutes was this a day? 45

▶ In this problem you are told how many minutes Sally practiced in 3 da. So you do not need to add before you divide. Divide by 3 to find the average number of minutes she practiced a day. This is a one-step problem.

3. Andy practiced on his horn 150 min. all together on 6 da. last week. On the average, how many minutes did he practice a day? 25

4. Tom takes lessons on the drum. He tries to practice 5 hr. a week for a 6-day week. How many minutes, on the average, is this a day? 50 Change 5 hr. to minutes. 300 min.

Do problems orally with pupils, reviewing first the meaning of average and ways to find it. Stress fact that some problems may have two steps. Insist that all answers be labeled.

1. Bill's father drove his car 1060 mi. in 4 da. How many miles a day did he average? 265
2. Mother drove 210 mi. to take Betty to camp. She took 5 hr. for the trip. What was the average number of miles she drove an hour? 42
3. Last week Peter spent $1.60 for 5 lunches at school. What was the average cost of his lunch a day? $.32
4. At 9 A.M. the temperature for each day this past week was as follows: 49°, 51°, 45°, 55°, 59°, 50°, 48°. Find the average temperature at 9 A.M. this week. 51°
5. On 6 da. one week Ben sold 378 papers. What was the average number of papers he sold a day? 63
6. In 4 mo. Susan saved $9.00. On the average, how much did Susan save a month? $2.25
7. Five boys weigh these numbers of pounds: 60 lb., 55 lb., 57 lb., 61 lb., 57 lb. What is the average weight in this group of boys? 58 lb.

Find the average of these numbers:

8. 20, 24, 26, 22, 18 22

9. 44, 37, 39, 35, 40 39

10. 61, 56, 64, 69, 65 63

11. 23, 10, 15, 21, 31 20

12. 79, 68, 90, 64, 69 74

13. 34, 26, 32, 28, 35 31

14. $1.25, $1.94, $1.43, $1.51, $1.77 $1.58

15. $.27, $.32, $.35, $.34, $.31, $.39 $.33

16. $.48, $.54, $.50, $.45, $.49, $.36 $.47

17. $.97, $.83, $.75, $.91, $.88, $.94 $.88

Let pupils do problems independently. Then discuss them with class, letting different pupils explain their answers, restating rule for finding averages.

Problems without Questions

Make a good question for each problem, using all the numbers in the problem. Then find the answer:

1. Each school bus carries 45 children. There are 6 school busses.

2. A school bus can carry 45 children. There were 38 children in the bus this morning.

3. Two boys bought a package of paper for \$1.90 and shared the cost of it.

4. The two boys also shared the 500 sheets of paper in the package.

5. Ann wants to buy a sweater that costs \$3.49. She has saved \$2.75 so far.

6. Father wants to drive his car 300 mi. today. Now he has gone 135 mi.

7. Jim bought 75 four-cent stamps for Mother.

8. Bill spent \$.35 to ride on a pony, \$.25 for ice cream and popcorn, and \$.25 to ride on a little train.

9. Peggy needs \$42 to go to camp next summer. She has \$30 now and can save \$4 a month.

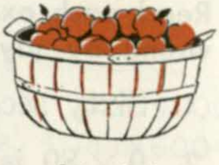
10. Joe has a library book. He took it out of the library on April 7. He must return it at the end of 2 wk.

11. Once Joe kept a library book 5 da. over 2 wk. Then Joe had to pay 2¢ for each day over 2 wk.

Urge pupils to use many thought patterns in completing the problems. Let pupils read their questions for the same examples and have class solve the problems.

Pecks and Bushels

1. Where you live, do you buy apples by the pound or by the peck, half peck, or bushel? If you do not know, try to find out at the store.


1 bushel

2. The farmer who grows the apples often sells them by the bushel. The bushel and peck are measures for use with dry things like apples and beans. Name 3 things that are often sold by the peck or bushel.

1 peck

3. Learn this table of dry measure:

Emphasize.

2 pints (pt.) = 1 quart (qt.)
8 quarts (qt.) = 1 peck (pk.)
4 pecks (pk.) = 1 bushel (bu.)

4. Jack bought 1 bu. apples and sold them by the quart. How many quarts of apples did Jack sell? 32

5. Jack paid $2.50 for the apples and sold them for $.12 a quart. How much money did he make? $1.34

6. Father gives his chickens 2 qt. of feed a day. How many days will 1 pk. of feed last? 4 How many days will 1 bu. of feed last? 16

Tell the right number to put in each space:

7. 1 bu. = 4 pk. 1 pk. = 8 qt. 1 bu. = 32 qt.

8. $\frac{1}{4}$ bu. = 8 qt. $\frac{1}{4}$ pk. = 2 qt. 3 pk. = 24 qt.

Point out and demonstrate that the liquid measures, pint and quart, are smaller than the dry measures, pint and quart. If possible display and contrast containers used for liquid and dry measures.

Provide oral test on basic understandings. See G-100 for topic coverage.

Yes or No?

Read each exercise below. Then tell whether it is right or wrong by saying "Yes" or "No":

1. Sixty seconds make one hour. No
2. 9 × 89 is more than 10 × 75. Yes
3. The year 1960 was a leap year. Yes
4. A dress for Mary takes 3 mi. of cloth. No
5. The average of 8, 9, and 10 is 9. Yes
6. 1000 is less than 20 × 60. Yes
7. 15 in. of ribbon is longer than 1 ft. Yes
8. 10 is less than $\frac{1}{6}$ of 48. No
9. A triangle has 3 sides and 3 angles. Yes
10. The answer for 6 × 0 × 7 is 42. No
11. 599 ÷ 6 is closer to 100 than to 90. Yes
12. September is the month that follows October. No
13. 120 is a good estimate for 6 × 19. Yes
14. Two weeks after May 6 is May 20. Yes
15. A rectangle always has 4 equal sides. No
16. XVIII is a larger Roman numeral than XX. No
17. From 2:15 P.M. to 3:30 P.M. is 1 hr. 15 min. Yes
18. From 12 noon to 12 noon the next day is 12 hr. No
19. To change any number of pints to quarts, you must divide by 2. Yes
20. To change any number of feet to yards, you must multiply by 3. No

Use this test to spot-check for class or individual weaknesses. Some areas may need to be reviewed further. Note errors on progress cards for possible summer remedial program.

Provide written test on basic understandings.

Mixed Review

1. Write the number that means
   (a) 9 thousands, 7 hundreds, 5 tens, 3 ones 9753
   (b) 4 thousands, 9 hundreds, no tens, no ones 4900
   (c) 6 thousands, no hundreds, no tens, 4 ones 6004

2. Find the difference between 3294 and 4000. 706

3. Multiply 78 by 50; 3900 367 by 49; 17,983 1475 by 8. 11,800

4. Find the average of 89, 103, 92, 100. 96

5. How many 7's are there in 455? 65 in 2688? 384

6. Add 3705, 2876, 4100, and 3989. 14,670

7. Estimate the cost of 5 lb. of meat at \$.59 a pound. Then find the exact cost. \$3.00 estimated; \$2.95 exact

8. Draw a rectangle, a square, and a circle. Draw a triangle that has a right angle in it.

9. Mary bought $\frac{1}{4}$ lb. of orange candy and $\frac{1}{4}$ lb. of nut candy. What part of a pound did Mary buy? $\frac{2}{4}$ or $\frac{1}{2}$

10. Tom and Ann are selling candy. They made 144 pieces of candy today and have packed it in 6 boxes of the same size. How many pieces did they put in each box? 24

11. The children sell each box of candy for \$.75. How much will they get for 6 boxes? \$4.50

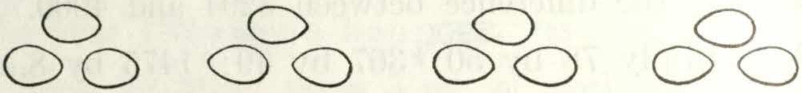
12. In the last 6 wk. the children have made and sold 48 boxes of candy. On the average, how many boxes is that a week? 8

Note areas of individual or class weaknesses. Review further as preparation for end-of-year tests and diagnostic test. Note results of test on progress cards.

Teach finding of fractional part of number using fractions with numerators larger than 1.

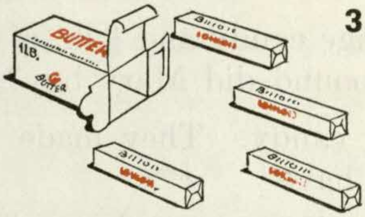
New Work with Fractions

1. Mrs. Wood asked Jack to sell her $\frac{3}{4}$ doz. eggs. Jack wanted to know how many eggs there are in $\frac{3}{4}$ doz. To find out he divided a dozen eggs into 4 equal groups like this:



There are 3 eggs in each group. Each group is $\frac{1}{4}$ of a dozen. How many eggs are there in 2 groups, or in $\frac{2}{4}$ of a dozen? 6 How many eggs are there in 3 groups, or in $\frac{3}{4}$ of a dozen? 9

2. Bill said, "Jack did not need to lay out eggs that way to find $\frac{3}{4}$ of a dozen. If he knows that $\frac{1}{4}$ of 12 is 3, then $\frac{3}{4}$ of 12 is 3 times 3, or 9." Stress.



3. Here is a pound of butter divided into 4 equal parts. Each part is $\frac{1}{4}$ of a pound. How many ounces are there in $\frac{1}{4}$ lb. of butter? 4

4. How many ounces does $\frac{3}{4}$ lb. of butter weigh? Find $\frac{3}{4}$ of 16 oz. as Bill found $\frac{3}{4}$ of 12 in ex. 2. 3 x 4 oz. = 12 oz.

5. Today Mother used $\frac{3}{4}$ lb. of butter for cakes and cookies. Butter is $.76 a pound. What was the cost of the butter Mother used for cakes and cookies? $.57

6. Tom bought a small piece of cheese. It was marked "$\frac{3}{8}$ lb." How many ounces did the cheese weigh? 6

7. The cheese in ex. 6 cost $.80 a pound. How much did Tom have to pay for the piece he bought? $.30

Review meaning of fractions first: bottom number tells number of equal parts in the whole, and top number tells number of parts being considered. Then follow development as given. Slower pupils may use objects, if needed.

Using Fractions

Find the number to put in each space. Work on paper:

1. $\frac{3}{4}$ hr. = 45 min. $\frac{2}{3}$ hr. = 40 min. $\frac{3}{4}$ gal. = 3 qt.
2. $\frac{3}{4}$ yd. = 27 in. $\frac{2}{3}$ ft. = 8 in. $\frac{2}{3}$ doz. = 8 eggs
3. $\frac{3}{4}$ ft. = 9 in. $\frac{2}{3}$ yd. = 24 in. $\frac{7}{8}$ lb. = 14 oz.
4. $\frac{5}{8}$ lb. = 10 oz. $\frac{5}{8}$ mi. = 3300 ft. $\frac{3}{4}$ bu. = 3 pk.
5. $\frac{3}{4}$ pk. = 6 qt. $\frac{5}{8}$ bu. = 20 qt. $\frac{3}{8}$ mi. = 1980 ft.

6. For Easter, Betty colored $\frac{3}{4}$ doz. eggs and Andy colored $\frac{2}{3}$ doz. How many eggs did each one color? 9 eggs (Betty), 8 eggs (Andy)

7. At \$.60 a dozen, how much did Betty's eggs cost? \$.45
At the same price, how much did Andy's eggs cost? \$.40

8. Peter sold $\frac{3}{4}$ bu. of apples by the quart and got \$.12 a quart for them. How much in all did Peter get? \$2.88

9. Jim sold $\frac{7}{8}$ pk. of apples by the quart and got \$.15 a quart for them. How much did Jim get for the apples he sold? \$1.05

Do all parts of ex. 10 before you begin ex. 11:

10. $\frac{1}{8}$ of 24 3 $\frac{3}{8}$ of 24 9 $\frac{5}{8}$ of 24 15 $\frac{7}{8}$ of 24 21
11. $\frac{1}{5}$ of 35 7 $\frac{2}{5}$ of 35 14 $\frac{3}{5}$ of 35 21 $\frac{4}{5}$ of 35 28
12. $\frac{1}{6}$ of 18 3 $\frac{2}{6}$ of 18 6 $\frac{4}{6}$ of 18 12 $\frac{5}{6}$ of 18 15
13. $\frac{1}{4}$ of 36 9 $\frac{3}{4}$ of 36 27 $\frac{1}{3}$ of 36 12 $\frac{2}{3}$ of 36 24
14. $\frac{1}{7}$ of 21 3 $\frac{2}{7}$ of 21 6 $\frac{4}{7}$ of 21 12 $\frac{6}{7}$ of 21 18
15. $\frac{3}{8}$ of 40 15 $\frac{2}{3}$ of 27 18 $\frac{3}{5}$ of 20 12 $\frac{7}{8}$ of 32 28

More Practice. See ㊴ on page 326.

Review measures before doing ex. 1–9. Urge pupils not to use objects. Ex. 10–15 should be done without pencil and paper. Stress that you find one of the parts first, then multiply by number of parts considered.

Provide end-of-year tests covering major skill areas taught in Grade 4 (pages 296-304).

Testing Yourself

Copy and find the answers. Watch the signs:

1.	89	248	707	58	609
	×53	+647	−369	×80	×49
	4717	895	338	4640	29,841

2. 4667 + 1492 + 2094 8253 526 + 419 + 178 + 436 1559

	362	904	290R7	857	429
3.	8)2896	6)5424	9)2617	7)5999	4)1716

4.	3913	8317	2806	8968
	+4258	−4853	×7	−2463
	8171	3464	19,642	6505
5.	1975	2385	8000	6197
	×6	+1615	−2724	−4398
	11,850	4000	5276	1799

Count 5 for each right answer.

Oral Practice

Give the answers. Watch the signs: Stress.

6.	9	17	4	12	7	8	9	13
	+4	−8	×8	−6	×9	+7	+9	−7
	13	9	32	6	63	15	18	6
7.	8	13	5	14	7	7	11	7
	×6	−5	+6	−5	×4	+9	−3	×7
	48	8	11	9	28	16	8	49
8.	8	5	15	9	9	16	6	7
	+6	×7	−6	+8	×5	−8	×9	+5
	14	35	9	17	45	8	54	12
9.	7	18	6	9	5	14	7	15
	×8	−9	×5	×6	+8	−6	+7	−7
	56	9	30	54	13	8	14	8

Vary tests with oral activities. Some written tests include oral work: page 296, ex. 6-9; pages 297-298, ex. 1-3; page 300, ex. 1-2; page 302, ex. 1-5; page 303, all oral. Pages 299, 301, 304 are written problem tests.

1. Take the test on the addition facts on page 7. If you write the answers, try to finish in 5 min. See answers for page 7.

Add 9 to each number; (1) add 10 to each; (2) add 20: (3)

(1),(2) 47,48 103,104 85,86 61,62 54,55 72,73 28,29 96,97
(3) **2.** 38 58 94 114 76 96 52 72 45 65 63 83 19 39 87 107

78,79 56,57 44,45 90,91 35,36 99,100 67,68 81,82
3. 69 89 47 67 35 55 81 101 26 46 90 110 58 78 72 92

Copy in columns, add, and check:

4. 26, 65, 43, 79, 47 260	476, 947, 856, 412	2691
5. 97, 54, 48, 34, 55 288	587, 541, 876, 237	2241
6. 58, 86, 35, 58, 28 265	129, 239, 256, 376	1000
7. 48, 75, 63, 79, 35 300	941, 560, 906, 329	2736
8. 65, 94, 86, 29, 53 327	648, 394, 720, 458	2220

9. How much is 57 plus 38 plus 96 plus 55? 246

10. Find the sum of $22.68, $15.34, $37.00, $40.83. $115.85

11. How much is 44 + 70 + 11 + 23 + 92 + 56? 296

Add and check. Write the answers on folded paper:

12.	538	678	879	620	456	260
	165	624	127	255	283	126
	367	639	398	419	994	443
	871	147	850	362	978	310
	126	912	238	246	335	776
	2067	3000	2492	1902	3046	1915

13.	382	310	638	771	194	644
	263	242	113	256	339	99
	247	436	757	303	96	126
	520	479	64	199	588	275
	346	800	328	326	418	224
	1758	2267	1900	1855	1635	1368

Do ex. 1-3 orally. If pupils need extra summer work, as evidenced by results of these tests, refer them to specific pages in text or "More Practice," pages 313-326.

Subtraction Review

1. Take the test on the subtraction facts on page 13. If you write the answers, try to finish in 5 min. See answers for page 13.

Subtract 5 from each;(1) **subtract 9;**(2) **subtract 10:**(3)

(1),(2) 63,59 34,30 41,37 70,66 15,11 49,45 82,78 86,82
(3) **2.** 68 58 39 29 46 36 75 65 20 10 54 44 87 77 91 81

67,63 75,71 90,86 38,34 56,52 77,73 21,17 29,25
3. 72 62 80 70 95 85 43 33 61 51 82 72 26 16 34 24

Subtract the second number from the first number:

4. $49.88, $26.38 $23.50

5. $53.45, $36.48 $16.97

6. $30.00, $14.76 $15.24

7. $77.78, $28.36 $49.42

8. $70.00, $38.32 $31.68

9. $45.34, $36.87 $8.47

10. $88.24, $72.44 $15.80

11. $40.00, $21.23 $18.77

12. Find the difference between 6581 and 4763. 1818

13. 4468 from 7224 leaves what remainder? 2756

14. Take 1474 from 4830; 3356 subtract 2776 from 3273. 497

15. Subtract 6788 from 6823; 35 take 1287 from 3610. 2323

Subtract and check. Write answers on folded paper:

16.	989	794	128	1407	6308	5242
	652	148	86	999	3312	2356
	337	646	42	408	2996	2886
17.	454	700	707	8003	9923	5791
	260	157	435	2127	7188	1412
	194	543	272	5876	2735	4379
18.	196	927	635	1548	5000	1818
	97	768	247	909	4384	823
	99	159	388	639	616	995
19.	684	629	143	3471	1192	8700
	236	473	46	2994	783	2352
	448	156	97	477	409	6348

Note results of tests (pages 296–304) on progress cards, to show improvements or areas of weakness.

1. The pupils in Bill's grade at school gave a radio program yesterday. They told about their plans for the summer vacation. The program was on the air from 2:15 P.M. to 2:40 P.M. How many minutes did it last? 25

2. Jack had 1 gal. of sirup. He sold it in small bottles. Each bottle held $\frac{1}{2}$ pt. of sirup. How many bottles of sirup did he have? 16

3. Our Stamp Club had an exhibit of stamp books. The boys brought 16 books and the girls brought 11. How many stamp books were in the exhibit? 27

4. The 27 pupils in the Stamp Club each bought a club pin. Each pin cost \$.85. How much money did they have to pay all together if they added \$.45 for mailing? \$23.40

5. Ann's spelling marks this week were 88, 87, 91, 91, and 93. What was her average spelling mark for this week? 90

6. In a game Susan made these scores: 11, 8, 12, 10, 14, 13. What was Susan's score all together? 68

7. For a school party Tom bought 3 doz. paper spoons. They were all used except 3. How many spoons were used for the party? 33

8. Last year Betty saved \$15.75. She wants to save twice as much this year. Find the amount of money Betty wants to save this year. \$31.50

Remind pupils to read problems carefully, look for and answer hidden questions, label all answers.

Multiplication Review

1. Take the test on the multiplication facts on page 196. If you write the answers, try to finish in 5 min. See answers for page 196.

Multiply each number by 10;(1) by 20;(2) by 30.(3)

(1),(2) 120,240 210,420 300,600 90,180 110,220 230,460 400,800 320,640
(3) **2.** 12 360 21 630 30 900 9 270 11 330 23 690 40 1200 32 960

Multiply and check:

3. 79 × $7.30 $576.70 8 × 8450 67,600 5 × $40.37 $201.85
4. 68 × $9.23 $627.64 4 × 1504 6016 9 × $35.29 $317.61
5. 54 × $3.99 $215.46 2 × 4896 9792 7 × $19.43 $136.01
6. 93 × $6.12 $569.16 5 × 1672 8360 6 × $61.08 $366.48
7. 41 × $2.85 $116.85 6 × 4395 26,370 4 × $38.27 $153.08
8. 62 × $1.76 $109.12 3 × 3798 11,394 8 × $12.39 $99.12
9. 18 × $6.71 $120.78 9 × 1049 9441 7 × $52.86 $370.02

10. Multiply 584 by 26; 15,184 by 95; 55,480 by 83; 48,472 by 70. 40,880

11. Subtract 400 from the product of 270 and 16. 3920

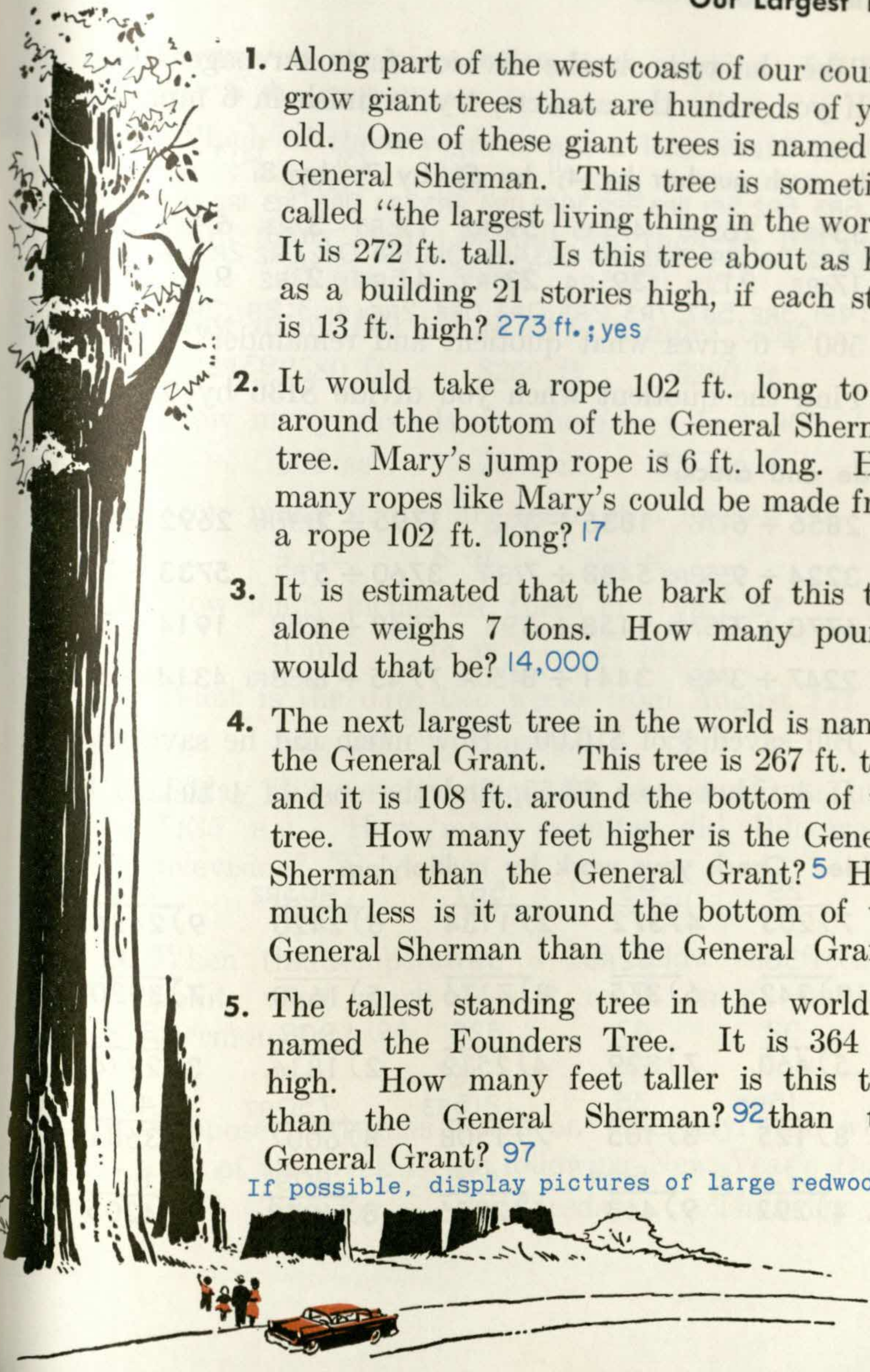
12. Add 1407 to the product of 48 and 76. 5055

Multiply. Check by going over your work:

13.	75 29 2175	86 85 7310	97 74 7178	68 19 1292	85 36 3060	64 43 2752
14.	82 70 5740	57 30 1710	52 50 2600	89 90 8010	79 60 4740	81 40 3240
15.	961 56 53,816	324 48 15,552	607 29 17,603	797 73 58,181	580 25 14,500	576 17 9792

Develop comprehension of size of trees by comparisons with large office buildings, trees in neighborhood, and so on.

Our Largest Trees



1. Along part of the west coast of our country grow giant trees that are hundreds of years old. One of these giant trees is named the General Sherman. This tree is sometimes called "the largest living thing in the world." It is 272 ft. tall. Is this tree about as high as a building 21 stories high, if each story is 13 ft. high? 273 ft.; yes

2. It would take a rope 102 ft. long to go around the bottom of the General Sherman tree. Mary's jump rope is 6 ft. long. How many ropes like Mary's could be made from a rope 102 ft. long? 17

3. It is estimated that the bark of this tree alone weighs 7 tons. How many pounds would that be? 14,000

4. The next largest tree in the world is named the General Grant. This tree is 267 ft. tall, and it is 108 ft. around the bottom of the tree. How many feet higher is the General Sherman than the General Grant? 5 How much less is it around the bottom of the General Sherman than the General Grant? 6 ft.

5. The tallest standing tree in the world is named the Founders Tree. It is 364 ft. high. How many feet taller is this tree than the General Sherman? 92 than the General Grant? 97

If possible, display pictures of large redwood trees.

Division Review

1. Take the test on the division facts on page 198. If you write the answers, try to finish in 6 min. See answers for page 198.

Divide each number by 4;(1) by 5;(2) by 7;(3) by 8:(4)*

(1), (2) 8R1, 6R3 6R2, 5R1 11R3, 9R2 14R3, 11R4 4R3, 3R4 0R3, 0R3 1R2, 1R1 5R2, 4R2

(3) **2.** 33 4R5 26 3R5 47 6R5 59 8R3 19 2R5 3 0R3 6 0R6 22 3R1

4R1, 3R2 5R1, 4R1 9R3, 7R4 5R3, 4R3 10R1, 8R1 0R2, 0R2 2R1, 1R4 7R3, 6R1

3. 17 2R3 21 3 39 5R4 23 3R2 41 5R6 2 0R2 9 1R2 31 4R3

*(4) Ex. 2: 4R1, 3R2, 5R7, 7R3, 2R3, 0R3, 0R6, 2R6; ex. 3: 2R1, 2R5, 4R7, 2R7, 5R1, 0R2, 1R1, 3R7

4. 560 ÷ 6 gives what quotient and remainder? 93 R2

5. Find the quotient when you divide 8136 by 9. 904

Divide and check:

6. 2856 ÷ 6 476 1836 ÷ 3 612 1795 ÷ 2 897R1 2692 ÷ 4 673

7. 3224 ÷ 9 358R2 5488 ÷ 7 784 3760 ÷ 5 752 5733 ÷ 7 819

8. 6770 ÷ 7 967R1 1158 ÷ 6 193 1548 ÷ 6 258 1914 ÷ 3 638

9. 2247 ÷ 3 749 3441 ÷ 8 430R1 7745 ÷ 8 968R1 4314 ÷ 6 719

10. Bill saved $\frac{1}{4}$ of \$10.00. How much did he save? \$2.50

11. If 3 tickets cost \$2.55, find the cost of 1 ticket. \$.85

Divide. Check your work by multiplying:

12. 7)203 29 4)372 93 2)1134 567 6)2420 403R2 9)2484 276

13. 9)342 38 6)375 62R3 8)7176 897 5)1640 328 7)3920 560

14. 5)460 92 7)329 47 4)2512 628 2)1816 908 3)2916 972

15. 8)125 15R5 3)105 35 7)1508 215R3 8)6007 750R7 9)3681 409

16. 4)292 73 9)463 51R4 6)2856 476 8)4872 609 5)4205 841

Choose the Right One

Three answers are given below each exercise. Tell which answer is the correct one:

1. Which of these years is **not** a leap year? 1958

1958 1960 1948

2. How many quarts of milk are there in 100 pt.? 50

25 qt. 50 qt. 200 qt.

3. How many feet are there in a mile? 5280

2580 ft. 8250 ft. 5280 ft.

4. How many seconds are there in $\frac{1}{4}$ hr.? 900

900 sec. 75 sec. 15 sec.

5. How many quarts are there in a bushel? 32

4 qt. 8 qt. 32 qt.

6. How many inches are there in $\frac{3}{4}$ yd.? 27

9 in. 18 in. 27 in.

7. What is the date two weeks from August 17? Aug. 31

Aug. 30 Aug. 31 Sept. 1

8. Today Bill watched television from 4:45 P.M. until 5:35 P.M. How many minutes did Bill watch television? 50

10 min. 40 min. 50 min.

9. When the temperature is 20° below the freezing point, what mark does it reach on an outdoor thermometer? 12°

0° 12° 20°

10. Suppose Christmas comes on Thursday. On what day of the week is the following New Year's Day? Thursday

Tuesday Wednesday Thursday

Problems

1. Jim paid $4.95 for a sweater and cap. The cap cost $.98. How much did the sweater cost? First estimate the answer. Then find the exact answer. Estimated, $4.00; exact, $3.97

2. Working after school 5 da. this week, Betty earned $.75, $.60, $.90, $.60, and $.75. What was the average amount she earned a day? $.72

3. George bought 3 tickets at $.95 each. He paid for them with $5.00. How much change did he get? $2.15

4. In ex. 3, George's change was a 1-dollar bill, 3 quarters, and 4 dimes. Was this the right change? $2.15; yes

5. It costs $19.75 to stay at camp for 1 wk. Estimate the cost of 3 wk. at camp. Then find on paper the exact answer. Estimated, $60.00; exact, $59.25

6. Mother bought the children 3 sweaters all alike. She paid $14.88 for them. Estimate the average cost of a sweater. Then find the exact cost. Estimated, $5.00; exact, $4.96

7. On a trip Father spent $38.63 on the car, $53.50 for rooms, $97.38 for food, and $11.66 for other things. How much did Father spend all together? $201.17

8. At the post office Betty gave the man $1.00 to pay for stamps that cost $.90. With the change she bought 3-cent lollipops. How many did she get? 3R1¢

9. Susan bought $\frac{1}{2}$ yd. of red ribbon at $.50 a yard and buttons for $.45. How much did she spend? $.70

10. In Park School there are 382 pupils. In Fairfield School there are 408 pupils. Find the difference in the numbers of pupils in these schools. 26

See G-103 for correlation of examples with aims.

Chapter Review

Find the answers:

1. $\frac{1}{6}$ of 30 5 $\frac{2}{6}$ of 30 10 $\frac{3}{6}$ of 30 15 $\frac{5}{6}$ of 30 25

2. $\frac{1}{3}$ of 24 8 $\frac{2}{3}$ of 24 16 $\frac{3}{4}$ of 24 18 $\frac{7}{8}$ of 24 21

3. Multiply each number by 39; (1) by 62; (2) by 57; (3) by 10: (4)

(1), (2) 3627, 5766 663, 1054 2652, 4216 1794, 2852 975, 1550 3471, 5518 2886, 4588 1950, 3100
(3) 93 5301 17 969 68 3876 46 2622 25 1425 89 5073 74 4218 50 2850
(4) 930 170 680 460 250 890 740 500

Divide and check:

4. $5\overline{)\overset{528}{2640}}$ $8\overline{)\overset{625}{5000}}$ $4\overline{)\overset{463}{1852}}$ $9\overline{)\overset{825\text{R}3}{7428}}$ $8\overline{)\overset{438}{3504}}$

5. $7\overline{)\overset{560\text{R}6}{3926}}$ $6\overline{)\overset{706\text{R}3}{4239}}$ $9\overline{)\overset{384}{3456}}$ $7\overline{)\overset{837}{5859}}$ $3\overline{)\overset{975}{2925}}$

6. How many pecks are there in 1 bushel of apples? 4

7. How many quarts are there in 1 bushel of apples? 32

8. How many eggs are there in $\frac{1}{2}$ doz.? 6 in $\frac{3}{4}$ doz.? 9

9. Which is longer, $\frac{1}{2}$ in. or $\frac{1}{4}$ in.? $\frac{1}{2}$ $\frac{1}{2}$ in. or $\frac{3}{4}$ in.? $\frac{3}{4}$

10. Which is longer, $\frac{1}{2}$ in. or $\frac{4}{8}$ in.? Neither $\frac{3}{4}$ in. or $\frac{6}{8}$ in.? Neither

11. Estimate the cost of 9 books at \$2.98 each. \$27.00

12. Find the average of 19¢, 33¢, 25¢, 46¢, 37¢. 32¢

13. A bushel of potatoes weighs 60 lb. How many pounds does $\frac{3}{4}$ bu. of potatoes weigh? 45

14. Ann bought $\frac{3}{4}$ lb. of nuts. How many ounces of nuts did she get? 12

15. Estimate the change you will get from \$5.00 if you buy meat for \$2.09 and vegetables for \$.95. \$2.00

16. Father drove 752 mi. in 4 da. That was an average of how many miles a day? 188

Addition of fractions is not reviewed or tested as this work was developed as preparation for Grade 5. Note pupils' weaknesses, evidenced by this review, on progress cards.

A Problem Test

1. At the store Dick spent \$.25, \$.19, \$.08, \$.39, and \$.28. How much did he spend all together? \$1.19

2. Betty and Ann earned \$32 and shared it equally. \$12 Betty saved $\frac{3}{4}$ of her share. How much did she save?

3. Mrs. White paid \$3.12 for 8 baskets of berries. At this price, what would 15 baskets cost? \$5.85

4. One coat costs \$29.95 and another costs \$34.00. Find the difference between the prices of the coats. \$4.05

5. Ann's marks in arithmetic last month were 86, 89, 93, and 92. Find her average mark for last month. 90

6. Bill saves \$.65 a week. How much will he save in 52 wk., or 1 yr.? \$33.80

7. The 3 Hunter children have a new radio that cost \$37.95. Their father paid \$15.00 toward the radio. The 3 children shared the rest of the cost. What was each child's share of the cost? \$7.65

8. One day 144 children danced on the playground. There were 8 children in each group. How many groups were there? 18 Were any children left out? No

9. Susan bought 24 paper hats at \$.19 each. She paid for them with a 5-dollar bill. How much change did Susan get? Name coins that make this change.
\$.44 1 quarter, 1 dime, 1 nickel, 4 pennies

10. John was in summer camp 49 da. and Betty was in camp 35 da. How much longer was John in camp than Betty? 14 How many weeks is this? 2

This is the last Problem Test. Did you have every problem right?

Remind pupils to read problems carefully to determine what the problem asks, facts known, process or processes to use, how to write it in figures. Stress labeling of answers and possibility of hidden questions.

Provide diagnostic test of skills taught.

How Much Have You Learned?

If you miss more than one example in a row, turn to the Practice Pages for that row.

Add and check:

					Practice Pages
1.	247 193 405 628 146 1619	464 789 403 887 525 3068	745 267 769 351 296 2428	297 586 364 399 834 2480	271

Subtract and check:

2.	6177 4589 1588	5434 1354 4080	4000 1767 2233	1560 998 562	189, 192

Multiply and check:

3.	217 85 18,445	608 49 29,792	389 26 10,114	547 73 39,931	225
4.	4257 6 25,542	1725 9 15,525	3694 5 18,470	6918 7 48,426	245

Divide and check:

5.	279 3)837	762 9)6858	198 R2 6)1190	583 R1 8)4665	212
6.	190 R3 5)953	703 7)4921	608 R3 4)2435	450 9)4050	256, 258

Find the answers:

7.	$\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$ $\frac{3}{4}$	$\frac{1}{4} + \frac{3}{4}$ $\frac{4}{4}$ or 1	$\frac{1}{8} + \frac{5}{8} + \frac{1}{8}$ $\frac{7}{8}$	284
8.	$\frac{1}{8}$ of 32 4	$\frac{7}{8}$ of 32 28	$\frac{5}{8}$ of 32 20	295

Observe pupils as they work, and note hesitancy or errors on progress cards. Compare results with previous ones and note improvements or weaknesses.

Use this page as diagnostic test to give summary of pupils' abilities on progress cards.

Test on the Year's Work

1. Give the answers to all the number facts on pages 7, 13, 196, and 198 of this book. See answers for these pages.

2. Add:

$$\begin{array}{r} 2479 \\ 1835 \\ \hline 4314 \end{array}$$

3. Subtract:

$$\begin{array}{r} 9755 \\ 5389 \\ \hline 4366 \end{array}$$

4. Multiply:

$$\begin{array}{r} \$9.85 \\ 7 \\ \hline \$68.95 \end{array}$$

5. Add:

$$\begin{array}{r} \$2.75 \\ 3.86 \\ 1.98 \\ .75 \\ 4.09 \\ \hline \$13.43 \end{array}$$

6. Find the sum: \$15.63 + \$24.79 + \$4.98 \$45.40

7. Subtract:

$$\begin{array}{r} 5000 \\ 3246 \\ \hline 1754 \end{array}$$

8. Multiply:

$$\begin{array}{r} 367 \\ 49 \\ \hline 17{,}983 \end{array}$$

9. Multiply:

$$\begin{array}{r} 2049 \\ 8 \\ \hline 16{,}392 \end{array}$$

10. Divide:

$$\begin{array}{r} \$\ 4.75 \\ 4\overline{)\$19.00} \end{array}$$

11. Divide:

$$\begin{array}{r} 803 \\ 8\overline{)6424} \end{array}$$

12. Divide:

$$\begin{array}{r} 690\text{ R5} \\ 7\overline{)4835} \end{array}$$

13. How many bushels are there in 28 pk. of apples? 7

14. How many eggs are there in $\frac{3}{4}$ doz. eggs? 9

15. Find the average of 115, 132, 97, and 124. 117

16. How many weeks and days are there in May? 4 wk. 3 da.

17. Bob saved \$7.50 a month for 6 months. He spent all but \$5.25 of what he saved for a bicycle. How much did Bob pay for the bicycle? \$39.75

18. Jane's change from a dollar was 2 quarters, 1 dime, and 1 nickel. How much did Jane spend? \$.35

Provide ready reference of basic addition, subtraction (page 310), multiplication (page 311), and division facts (page 312).

The 100 Addition Facts

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} \\ 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} \\ 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{2} & \underline{2} & \underline{2} & \underline{2} & \underline{2} & \underline{2} & \underline{2} & \underline{2} & \underline{2} & \underline{2} \\ 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{3} & \underline{3} & \underline{3} & \underline{3} & \underline{3} & \underline{3} & \underline{3} & \underline{3} & \underline{3} & \underline{3} \\ 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{4} & \underline{4} & \underline{4} & \underline{4} & \underline{4} & \underline{4} & \underline{4} & \underline{4} & \underline{4} & \underline{4} \\ 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{5} & \underline{5} & \underline{5} & \underline{5} & \underline{5} & \underline{5} & \underline{5} & \underline{5} & \underline{5} & \underline{5} \\ 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{6} & \underline{6} & \underline{6} & \underline{6} & \underline{6} & \underline{6} & \underline{6} & \underline{6} & \underline{6} & \underline{6} \\ 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{7} & \underline{7} & \underline{7} & \underline{7} & \underline{7} & \underline{7} & \underline{7} & \underline{7} & \underline{7} & \underline{7} \\ 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{8} & \underline{8} & \underline{8} & \underline{8} & \underline{8} & \underline{8} & \underline{8} & \underline{8} & \underline{8} & \underline{8} \\ 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 \end{array}$$

$$\begin{array}{rrrrrrrrrr} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ \underline{9} & \underline{9} & \underline{9} & \underline{9} & \underline{9} & \underline{9} & \underline{9} & \underline{9} & \underline{9} & \underline{9} \\ 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 \end{array}$$

Facts are listed in sequential order so that pupils may see relationships which exist between them. Be sure to point out these relationships.

The 100 Subtraction Facts

$\begin{array}{r}0\\0\\\hline 0\end{array}$	$\begin{array}{r}1\\0\\\hline 1\end{array}$	$\begin{array}{r}2\\0\\\hline 2\end{array}$	$\begin{array}{r}3\\0\\\hline 3\end{array}$	$\begin{array}{r}4\\0\\\hline 4\end{array}$	$\begin{array}{r}5\\0\\\hline 5\end{array}$	$\begin{array}{r}6\\0\\\hline 6\end{array}$	$\begin{array}{r}7\\0\\\hline 7\end{array}$	$\begin{array}{r}8\\0\\\hline 8\end{array}$	$\begin{array}{r}9\\0\\\hline 9\end{array}$
$\begin{array}{r}1\\1\\\hline 0\end{array}$	$\begin{array}{r}2\\1\\\hline 1\end{array}$	$\begin{array}{r}3\\1\\\hline 2\end{array}$	$\begin{array}{r}4\\1\\\hline 3\end{array}$	$\begin{array}{r}5\\1\\\hline 4\end{array}$	$\begin{array}{r}6\\1\\\hline 5\end{array}$	$\begin{array}{r}7\\1\\\hline 6\end{array}$	$\begin{array}{r}8\\1\\\hline 7\end{array}$	$\begin{array}{r}9\\1\\\hline 8\end{array}$	$\begin{array}{r}10\\1\\\hline 9\end{array}$
$\begin{array}{r}2\\2\\\hline 0\end{array}$	$\begin{array}{r}3\\2\\\hline 1\end{array}$	$\begin{array}{r}4\\2\\\hline 2\end{array}$	$\begin{array}{r}5\\2\\\hline 3\end{array}$	$\begin{array}{r}6\\2\\\hline 4\end{array}$	$\begin{array}{r}7\\2\\\hline 5\end{array}$	$\begin{array}{r}8\\2\\\hline 6\end{array}$	$\begin{array}{r}9\\2\\\hline 7\end{array}$	$\begin{array}{r}10\\2\\\hline 8\end{array}$	$\begin{array}{r}11\\2\\\hline 9\end{array}$
$\begin{array}{r}3\\3\\\hline 0\end{array}$	$\begin{array}{r}4\\3\\\hline 1\end{array}$	$\begin{array}{r}5\\3\\\hline 2\end{array}$	$\begin{array}{r}6\\3\\\hline 3\end{array}$	$\begin{array}{r}7\\3\\\hline 4\end{array}$	$\begin{array}{r}8\\3\\\hline 5\end{array}$	$\begin{array}{r}9\\3\\\hline 6\end{array}$	$\begin{array}{r}10\\3\\\hline 7\end{array}$	$\begin{array}{r}11\\3\\\hline 8\end{array}$	$\begin{array}{r}12\\3\\\hline 9\end{array}$
$\begin{array}{r}4\\4\\\hline 0\end{array}$	$\begin{array}{r}5\\4\\\hline 1\end{array}$	$\begin{array}{r}6\\4\\\hline 2\end{array}$	$\begin{array}{r}7\\4\\\hline 3\end{array}$	$\begin{array}{r}8\\4\\\hline 4\end{array}$	$\begin{array}{r}9\\4\\\hline 5\end{array}$	$\begin{array}{r}10\\4\\\hline 6\end{array}$	$\begin{array}{r}11\\4\\\hline 7\end{array}$	$\begin{array}{r}12\\4\\\hline 8\end{array}$	$\begin{array}{r}13\\4\\\hline 9\end{array}$
$\begin{array}{r}5\\5\\\hline 0\end{array}$	$\begin{array}{r}6\\5\\\hline 1\end{array}$	$\begin{array}{r}7\\5\\\hline 2\end{array}$	$\begin{array}{r}8\\5\\\hline 3\end{array}$	$\begin{array}{r}9\\5\\\hline 4\end{array}$	$\begin{array}{r}10\\5\\\hline 5\end{array}$	$\begin{array}{r}11\\5\\\hline 6\end{array}$	$\begin{array}{r}12\\5\\\hline 7\end{array}$	$\begin{array}{r}13\\5\\\hline 8\end{array}$	$\begin{array}{r}14\\5\\\hline 9\end{array}$
$\begin{array}{r}6\\6\\\hline 0\end{array}$	$\begin{array}{r}7\\6\\\hline 1\end{array}$	$\begin{array}{r}8\\6\\\hline 2\end{array}$	$\begin{array}{r}9\\6\\\hline 3\end{array}$	$\begin{array}{r}10\\6\\\hline 4\end{array}$	$\begin{array}{r}11\\6\\\hline 5\end{array}$	$\begin{array}{r}12\\6\\\hline 6\end{array}$	$\begin{array}{r}13\\6\\\hline 7\end{array}$	$\begin{array}{r}14\\6\\\hline 8\end{array}$	$\begin{array}{r}15\\6\\\hline 9\end{array}$
$\begin{array}{r}7\\7\\\hline 0\end{array}$	$\begin{array}{r}8\\7\\\hline 1\end{array}$	$\begin{array}{r}9\\7\\\hline 2\end{array}$	$\begin{array}{r}10\\7\\\hline 3\end{array}$	$\begin{array}{r}11\\7\\\hline 4\end{array}$	$\begin{array}{r}12\\7\\\hline 5\end{array}$	$\begin{array}{r}13\\7\\\hline 6\end{array}$	$\begin{array}{r}14\\7\\\hline 7\end{array}$	$\begin{array}{r}15\\7\\\hline 8\end{array}$	$\begin{array}{r}16\\7\\\hline 9\end{array}$
$\begin{array}{r}8\\8\\\hline 0\end{array}$	$\begin{array}{r}9\\8\\\hline 1\end{array}$	$\begin{array}{r}10\\8\\\hline 2\end{array}$	$\begin{array}{r}11\\8\\\hline 3\end{array}$	$\begin{array}{r}12\\8\\\hline 4\end{array}$	$\begin{array}{r}13\\8\\\hline 5\end{array}$	$\begin{array}{r}14\\8\\\hline 6\end{array}$	$\begin{array}{r}15\\8\\\hline 7\end{array}$	$\begin{array}{r}16\\8\\\hline 8\end{array}$	$\begin{array}{r}17\\8\\\hline 9\end{array}$
$\begin{array}{r}9\\9\\\hline 0\end{array}$	$\begin{array}{r}10\\9\\\hline 1\end{array}$	$\begin{array}{r}11\\9\\\hline 2\end{array}$	$\begin{array}{r}12\\9\\\hline 3\end{array}$	$\begin{array}{r}13\\9\\\hline 4\end{array}$	$\begin{array}{r}14\\9\\\hline 5\end{array}$	$\begin{array}{r}15\\9\\\hline 6\end{array}$	$\begin{array}{r}16\\9\\\hline 7\end{array}$	$\begin{array}{r}17\\9\\\hline 8\end{array}$	$\begin{array}{r}18\\9\\\hline 9\end{array}$

The 100 Multiplication Facts

0 0 0	1 0 0	2 0 0	3 0 0	4 0 0	5 0 0	6 0 0	7 0 0	8 0 0	9 0 0
0 1 0	1 1 1	2 1 2	3 1 3	4 1 4	5 1 5	6 1 6	7 1 7	8 1 8	9 1 9
0 2 0	1 2 2	2 2 4	3 2 6	4 2 8	5 2 10	6 2 12	7 2 14	8 2 16	9 2 18
0 3 0	1 3 3	2 3 6	3 3 9	4 3 12	5 3 15	6 3 18	7 3 21	8 3 24	9 3 27
0 4 0	1 4 4	2 4 8	3 4 12	4 4 16	5 4 20	6 4 24	7 4 28	8 4 32	9 4 36
0 5 0	1 5 5	2 5 10	3 5 15	4 5 20	5 5 25	6 5 30	7 5 35	8 5 40	9 5 45
0 6 0	1 6 6	2 6 12	3 6 18	4 6 24	5 6 30	6 6 36	7 6 42	8 6 48	9 6 54
0 7 0	1 7 7	2 7 14	3 7 21	4 7 28	5 7 35	6 7 42	7 7 49	8 7 56	9 7 63
0 8 0	1 8 8	2 8 16	3 8 24	4 8 32	5 8 40	6 8 48	7 8 56	8 8 64	9 8 72
0 9 0	1 9 9	2 9 18	3 9 27	4 9 36	5 9 45	6 9 54	7 9 63	8 9 72	9 9 81

The 90 Division Facts

$\begin{array}{r}1\\1\overline{)1}\end{array}$	$\begin{array}{r}2\\1\overline{)2}\end{array}$	$\begin{array}{r}3\\1\overline{)3}\end{array}$	$\begin{array}{r}4\\1\overline{)4}\end{array}$	$\begin{array}{r}5\\1\overline{)5}\end{array}$	$\begin{array}{r}6\\1\overline{)6}\end{array}$	$\begin{array}{r}7\\1\overline{)7}\end{array}$	$\begin{array}{r}8\\1\overline{)8}\end{array}$	$\begin{array}{r}9\\1\overline{)9}\end{array}$
$\begin{array}{r}1\\2\overline{)2}\end{array}$	$\begin{array}{r}2\\2\overline{)4}\end{array}$	$\begin{array}{r}3\\2\overline{)6}\end{array}$	$\begin{array}{r}4\\2\overline{)8}\end{array}$	$\begin{array}{r}5\\2\overline{)10}\end{array}$	$\begin{array}{r}6\\2\overline{)12}\end{array}$	$\begin{array}{r}7\\2\overline{)14}\end{array}$	$\begin{array}{r}8\\2\overline{)16}\end{array}$	$\begin{array}{r}9\\2\overline{)18}\end{array}$
$\begin{array}{r}1\\3\overline{)3}\end{array}$	$\begin{array}{r}2\\3\overline{)6}\end{array}$	$\begin{array}{r}3\\3\overline{)9}\end{array}$	$\begin{array}{r}4\\3\overline{)12}\end{array}$	$\begin{array}{r}5\\3\overline{)15}\end{array}$	$\begin{array}{r}6\\3\overline{)18}\end{array}$	$\begin{array}{r}7\\3\overline{)21}\end{array}$	$\begin{array}{r}8\\3\overline{)24}\end{array}$	$\begin{array}{r}9\\3\overline{)27}\end{array}$
$\begin{array}{r}1\\4\overline{)4}\end{array}$	$\begin{array}{r}2\\4\overline{)8}\end{array}$	$\begin{array}{r}3\\4\overline{)12}\end{array}$	$\begin{array}{r}4\\4\overline{)16}\end{array}$	$\begin{array}{r}5\\4\overline{)20}\end{array}$	$\begin{array}{r}6\\4\overline{)24}\end{array}$	$\begin{array}{r}7\\4\overline{)28}\end{array}$	$\begin{array}{r}8\\4\overline{)32}\end{array}$	$\begin{array}{r}9\\4\overline{)36}\end{array}$
$\begin{array}{r}1\\5\overline{)5}\end{array}$	$\begin{array}{r}2\\5\overline{)10}\end{array}$	$\begin{array}{r}3\\5\overline{)15}\end{array}$	$\begin{array}{r}4\\5\overline{)20}\end{array}$	$\begin{array}{r}5\\5\overline{)25}\end{array}$	$\begin{array}{r}6\\5\overline{)30}\end{array}$	$\begin{array}{r}7\\5\overline{)35}\end{array}$	$\begin{array}{r}8\\5\overline{)40}\end{array}$	$\begin{array}{r}9\\5\overline{)45}\end{array}$
$\begin{array}{r}1\\6\overline{)6}\end{array}$	$\begin{array}{r}2\\6\overline{)12}\end{array}$	$\begin{array}{r}3\\6\overline{)18}\end{array}$	$\begin{array}{r}4\\6\overline{)24}\end{array}$	$\begin{array}{r}5\\6\overline{)30}\end{array}$	$\begin{array}{r}6\\6\overline{)36}\end{array}$	$\begin{array}{r}7\\6\overline{)42}\end{array}$	$\begin{array}{r}8\\6\overline{)48}\end{array}$	$\begin{array}{r}9\\6\overline{)54}\end{array}$
$\begin{array}{r}1\\7\overline{)7}\end{array}$	$\begin{array}{r}2\\7\overline{)14}\end{array}$	$\begin{array}{r}3\\7\overline{)21}\end{array}$	$\begin{array}{r}4\\7\overline{)28}\end{array}$	$\begin{array}{r}5\\7\overline{)35}\end{array}$	$\begin{array}{r}6\\7\overline{)42}\end{array}$	$\begin{array}{r}7\\7\overline{)49}\end{array}$	$\begin{array}{r}8\\7\overline{)56}\end{array}$	$\begin{array}{r}9\\7\overline{)63}\end{array}$
$\begin{array}{r}1\\8\overline{)8}\end{array}$	$\begin{array}{r}2\\8\overline{)16}\end{array}$	$\begin{array}{r}3\\8\overline{)24}\end{array}$	$\begin{array}{r}4\\8\overline{)32}\end{array}$	$\begin{array}{r}5\\8\overline{)40}\end{array}$	$\begin{array}{r}6\\8\overline{)48}\end{array}$	$\begin{array}{r}7\\8\overline{)56}\end{array}$	$\begin{array}{r}8\\8\overline{)64}\end{array}$	$\begin{array}{r}9\\8\overline{)72}\end{array}$
$\begin{array}{r}1\\9\overline{)9}\end{array}$	$\begin{array}{r}2\\9\overline{)18}\end{array}$	$\begin{array}{r}3\\9\overline{)27}\end{array}$	$\begin{array}{r}4\\9\overline{)36}\end{array}$	$\begin{array}{r}5\\9\overline{)45}\end{array}$	$\begin{array}{r}6\\9\overline{)54}\end{array}$	$\begin{array}{r}7\\9\overline{)63}\end{array}$	$\begin{array}{r}8\\9\overline{)72}\end{array}$	$\begin{array}{r}9\\9\overline{)81}\end{array}$
$\begin{array}{r}0\\1\overline{)0}\end{array}$	$\begin{array}{r}0\\2\overline{)0}\end{array}$	$\begin{array}{r}0\\3\overline{)0}\end{array}$	$\begin{array}{r}0\\4\overline{)0}\end{array}$	$\begin{array}{r}0\\5\overline{)0}\end{array}$	$\begin{array}{r}0\\6\overline{)0}\end{array}$	$\begin{array}{r}0\\7\overline{)0}\end{array}$	$\begin{array}{r}0\\8\overline{)0}\end{array}$	$\begin{array}{r}0\\9\overline{)0}\end{array}$

Pages 313–326 provide practice material in all skills reviewed or taught in Grade 4.

More Practice

①

1. 8 + 6 14   7 + 9 16   6 + 4 10   4 + 9 13
2. 9 + 3 12   6 + 0 6   9 + 9 18   3 + 6 9
3. 6 + 6 12   4 + 4 8   8 + 2 10   6 + 9 15
4. 7 + 4 11   7 + 6 13   3 + 7 10   7 + 8 15
5. 9 + 6 15   1 + 8 9   4 + 8 12   5 + 9 14
6. 6 + 5 11   5 + 7 12   9 + 5 14   8 + 8 16
7. 7 + 7 14   4 + 6 10   3 + 3 6   8 + 3 11
8. 3 + 8 11   5 + 3 8   6 + 2 8   0 + 9 9
9. 5 + 6 11   6 + 8 14   2 + 9 11   7 + 3 10
10. 6 + 1 7   9 + 1 10   3 + 5 8   2 + 4 6
11. 7 + 5 12   9 + 4 13   7 + 2 9   9 + 8 17

②

12. 6 − 5 1   13 − 7 6   11 − 6 5   12 − 3 9
13. 8 − 2 6   14 − 9 5   10 − 1 9   11 − 7 4
14. 7 − 3 4   10 − 6 4   14 − 8 6   13 − 5 8
15. 9 − 7 2   14 − 5 9   10 − 5 5   15 − 8 7
16. 5 − 2 3   12 − 8 4   10 − 9 1   11 − 9 2
17. 6 − 6 0   13 − 4 9   12 − 7 5   10 − 3 7
18. 8 − 4 4   12 − 6 6   10 − 2 8   17 − 8 9
19. 9 − 5 4   11 − 3 8   13 − 8 5   10 − 8 2
20. 7 − 5 2   10 − 4 6   12 − 5 7   18 − 9 9
21. 6 − 4 2   16 − 7 9   14 − 6 8   10 − 7 3
22. 9 − 2 7   17 − 9 8   11 − 2 9   15 − 7 8

These pages are correlated with ones throughout the text. Use for individual pupil assistance, review and reinforcement of processes, reteaching, and so on.

More Practice

③

1.	91 +45 136	25 +62 87	78 +91 169	72 +32 104	314 +221 535	364 +312 676	200 +122 322
2.	81 +27 108	16 +52 68	46 +41 87	52 +74 126	421 +336 757	632 +367 999	517 +481 998
3.	35 +33 68	47 +52 99	36 +43 79	60 +84 144	120 +758 878	335 +610 945	441 +434 875

④

4.	4 + 5 9	14 + 5 19	24 + 5 29	34 + 5 39
5.	6 + 3 9	46 + 3 49	76 + 3 79	96 + 3 99
6.	2 + 7 9	22 + 7 29	42 + 7 49	52 + 7 59
7.	8 + 5 13	18 + 5 23	28 + 5 33	38 + 5 43
8.	3 + 7 10	33 + 7 40	53 + 7 60	83 + 7 90
9.	5 + 6 11	15 + 6 21	35 + 6 41	75 + 6 81
10.	9 + 9 18	29 + 9 38	49 + 9 58	59 + 9 68
11.	8 + 4 12	18 + 4 22	38 + 4 42	88 + 4 92
12.	7 + 5 12	37 + 5 42	57 + 5 62	67 + 5 72

⑤

13.	7 6 +9 22	8 5 +9 22	9 5 +6 20	4 6 +5 15	3 5 +8 16	3 7 +8 18	9 2 +5 16	3 9 +6 18	8 8 +7 23
14.	6 4 2 +7 19	9 6 4 +4 23	3 7 4 +8 22	7 2 8 +6 23	5 3 9 +5 22	7 4 7 +3 21	4 6 8 +8 26	3 8 4 +6 21	7 7 6 +4 24

⑥

1.	22	46	98	90	348	474	125
	+36	+85	+54	+58	+315	+293	+379
	58	131	152	148	663	767	504
2.	25	32	24	52	441	187	662
	+44	+57	+67	+35	+539	+784	+249
	69	89	91	87	980	971	911
3.	75	43	47	56	257	266	280
	+56	+66	+47	+78	+463	+557	+136
	131	109	94	134	720	823	416
4.	73	36	14	92	598	313	373
	+28	+59	+46	+74	+277	+279	+384
	101	95	60	166	875	592	757

5. 11 + 58 + 69 138 49 + 14 + 49 112 158 + 246 404

6. 56 + 21 + 72 149 43 + 75 + 38 156 772 + 153 925

⑦

7. 37 + 24 + 35 96 474 + 968 + 274 1716

8. 59 + 56 + 42 157 238 + 583 + 185 1006

9. 84 + 79 + 37 200 397 + 266 + 337 1000

10. 56 + 85 + 56 197 268 + 170 + 453 891

11. 77 + 94 + 24 195 789 + 398 + 247 1434

12. 99 + 45 + 57 201 604 + 169 + 249 1022

⑧

13.	68	79	45	78	559	696	108
	−10	−39	−31	−68	−351	−243	−64
	58	40	14	10	208	453	44
14.	92	83	58	67	644	787	698
	−52	−12	−32	−61	−424	−655	−661
	40	71	26	6	220	132	37
15.	84	49	96	84	169	876	133
	−60	−45	−85	−73	−76	−442	−43
	24	4	11	11	93	434	90

More Practice

⑨

1.	73	53	65	71	995	932	661
	−58	−26	−29	−63	−428	−323	−216
	15	27	36	8	567	609	445
2.	84	54	82	53	440	491	983
	−78	−45	−47	−39	−337	−142	−517
	6	9	35	14	103	349	466
3.	72	70	46	81	952	630	630
	−14	−41	−27	−54	−619	−118	−324
	58	29	19	27	333	512	306

⑩

4.	973	477	657	985	839	900
	−358	−385	−579	−256	−165	−312
	615	92	78	729	674	588
5.	892	525	711	808	636	743
	−549	−297	−665	−286	−578	−383
	343	228	46	522	58	360
6.	700	322	265	300	929	634
	−444	−134	−193	−285	−246	−436
	256	188	72	15	683	198
7.	527	662	544	265	984	800
	−454	−386	−149	−174	−445	−737
	73	276	395	91	539	63

⑪

8.	32	64	51	44	143	432	713
	×2	×2	×2	×2	×2	×2	×2
	64	128	102	88	286	864	1426
9.	61	53	72	83	411	230	132
	×3	×3	×3	×3	×3	×3	×3
	183	159	216	249	1233	690	396
10.	93	40	91	74	204	102	321
	×2	×3	×3	×2	×2	×3	×3
	186	120	273	148	408	306	963

⑫

1.	172 ×2 344	191 ×2 382	281 ×2 562	460 ×2 920	351 ×2 702	180 ×2 360
2.	394 ×2 788	130 ×7 910	253 ×2 506	183 ×2 366	120 ×8 960	121 ×6 726
3.	250 ×3 750	163 ×3 489	130 ×6 780	192 ×3 576	121 ×5 605	180 ×3 540
4.	271 ×3 813	240 ×3 720	283 ×3 849	230 ×4 920	153 ×3 459	121 ×7 847

⑬

5.	56 ×4 224	97 ×4 388	48 ×4 192	73 ×4 292	123 ×4 492	560 ×4 2240	891 ×4 3564
6.	35 ×4 140	60 ×4 240	29 ×4 116	87 ×4 348	451 ×4 1804	281 ×4 1124	470 ×4 1880
7.	42 ×2 84	93 ×4 372	49 ×3 147	24 ×5 120	324 ×4 1296	141 ×6 846	132 ×4 528

⑭

8.	3342 4210 +1447 8999	2742 3023 +3222 8987	4056 1512 +2311 7879	1532 5316 +2120 8968	4552 1011 +3434 8997
9.	1236 6404 +2147 9787	4505 2650 +2413 9568	4143 1395 +1081 6619	2608 1257 +4124 7989	5152 1323 +2361 8836
10.	6348 2144 +1354 9846	2165 2870 +3214 8249	1845 1004 +4621 7470	3032 3269 +2101 8402	3780 2573 +1143 7496

More Practice

⑮

1.	14 4)56	26 2)52	18 4)72	26 3)78	24 4)96	15 2)30
2.	25 3)75	16 4)64	18 3)54	16 2)32	19 4)76	19 3)57
3.	17 2)34	28 3)84	38 2)76	15 4)60	45 2)90	22 4)88
4.	23 4)92	15 3)45	36 2)72	17 4)68	13 4)52	24 3)72

⑯

5.	68R1 2)137	84R2 4)338	47R2 3)143	45R3 4)183	96R1 2)193
6.	89R2 3)269	67R1 2)135	82R3 4)331	53R1 3)160	95R2 4)382
7.	53R3 4)215	95R2 3)287	64R1 4)257	58R1 2)117	69R2 3)209
8.	38R1 3)115	29R2 4)118	85R1 2)171	74R1 3)223	76R1 4)305
9.	38R3 4)155	94R1 3)283	47R1 4)189	37R2 3)113	79R1 2)159
10.	98R1 2)197	43R3 4)175	78R2 3)236	59R2 4)238	78R1 4)313

⑰

11.	$.44 .63 +.14 $1.21	$.67 .44 +.25 $1.36	$.83 .55 +.33 $1.71	$.95 .23 +.36 $1.54	$2.97 4.21 +2.44 $9.62	$1.96 2.07 +5.22 $9.25
12.	$.16 .36 +.31 $.83	$.97 .80 +.04 $1.81	$.73 .16 +.53 $1.42	$.46 .12 +.44 $1.02	$5.58 4.52 +3.13 $13.23	$6.25 3.59 +1.25 $11.09
13.	$.63 .42 +.49 $1.54	$.57 .67 +.26 $1.50	$.84 .36 +.28 $1.48	$.17 .26 +.62 $1.05	$3.60 4.88 +1.18 $9.66	$4.79 1.12 +5.25 $11.16

⑱

1. 25 + 33 + 22 + 14 94   2411 + 1020 + 3537 6968
2. 47 + 14 + 33 + 42 136   3133 + 3122 + 2646 8901
3. 67 + 63 + 45 + 34 209   2754 + 1240 + 5884 9878
4. 79 + 56 + 64 + 33 232   2636 + 1815 + 4128 8579
5. 5797 − 4445 1352   1378 − 823 555   4571 − 1353 3218
6. 4733 − 2644 2089   5759 − 5285 474   9395 − 7387 2008
7. 8700 − 7434 1266   1188 − 545 643   3880 − 1235 2645
8. 6429 − 2656 3773   9072 − 6616 2456   4485 − 3286 1199

⑲

9. $\overset{86}{5\overline{)430}}$ $\overset{45}{5\overline{)225}}$ $\overset{92\text{R}2}{5\overline{)462}}$ $\overset{74}{5\overline{)370}}$ $\overset{53\text{R}4}{5\overline{)269}}$

10. $\overset{67}{5\overline{)335}}$ $\overset{23\text{R}2}{5\overline{)117}}$ $\overset{72}{5\overline{)360}}$ $\overset{36\text{R}3}{5\overline{)183}}$ $\overset{49}{5\overline{)245}}$

11. $\overset{32\text{R}4}{5\overline{)164}}$ $\overset{98}{5\overline{)490}}$ $\overset{58\text{R}1}{5\overline{)291}}$ $\overset{76}{5\overline{)380}}$ $\overset{89}{5\overline{)445}}$

⑳

12. 39 + 26 + 83 + 51 199   5618 + 1043 + 2514 9175
13. 73 + 19 + 46 + 27 165   3220 + 1425 + 2327 6972

14. $\begin{array}{r}91\\-74\\\hline 17\end{array}$ $\begin{array}{r}169\\-75\\\hline 94\end{array}$ $\begin{array}{r}592\\-424\\\hline 168\end{array}$ $\begin{array}{r}900\\-535\\\hline 365\end{array}$ $\begin{array}{r}8796\\-3225\\\hline 5571\end{array}$ $\begin{array}{r}8391\\-7563\\\hline 828\end{array}$

15. $\begin{array}{r}163\\\times 5\\\hline 815\end{array}$ $\begin{array}{r}359\\\times 2\\\hline 718\end{array}$ $\begin{array}{r}490\\\times 5\\\hline 2450\end{array}$ $\begin{array}{r}276\\\times 4\\\hline 1104\end{array}$ $\begin{array}{r}508\\\times 3\\\hline 1524\end{array}$

16. 290 ÷ 3 96R2   116 ÷ 2 58   328 ÷ 5 65R3   258 ÷ 3 86
17. 195 ÷ 5 39   305 ÷ 4 76R1   261 ÷ 3 87   135 ÷ 5 27

More Practice

㉑

1.	258 ×6 1548	263 ×8 2104	160 ×4 640	329 ×6 1974	146 ×6 876	625 ×6 3750
2.	116 ×9 1044	270 ×6 1620	163 ×3 489	166 ×7 1162	450 ×6 2700	803 ×6 4818
3.	662 ×5 3310	106 ×8 848	114 ×6 684	107 ×6 642	726 ×6 4356	980 ×6 5880
4.	206 ×7 1442	137 ×6 822	466 ×2 932	345 ×6 2070	169 ×6 1014	260 ×9 2340

㉒

5.	$1.45 6)$8.70	$ 4.64 R1¢ 6)$27.85	$ 5.93 4)$23.72	$ 8.36 6)$50.16	$ 3.48 R4¢ 5)$17.44
6.	$2.96 2)$5.92	$ 3.53 6)$21.18	$ 5.93 6)$35.58	$ 9.15 5)$45.75	$ 2.18 R2¢ 6)$13.10
7.	$1.58 R2¢ 6)$9.50	$ 7.98 R1¢ 3)$23.95	$ 5.47 6)$32.82	$ 6.87 5)$34.35	$ 4.69 R5¢ 6)$28.19
8.	$1.14 6)$6.84	$ 7.25 6)$43.50	$ 3.68 R3¢ 4)$14.75	$ 9.71 R4¢ 6)$58.30	$ 6.82 6)$40.92

㉓

9. 9 + 7 + 6 + 3 + 2 27 8 + 7 + 5 + 6 + 6 32

10. 4 + 7 + 5 + 4 + 4 24 5 + 4 + 6 + 3 + 8 26

11. 7 + 4 + 6 + 7 + 5 29 7 + 4 + 5 + 8 + 9 33

12. 5 + 6 + 9 + 2 + 7 29 9 + 5 + 8 + 3 + 5 30

13.	577 −535 42	864 −736 128	343 −124 219	2694 −1584 1110	7044 −3835 3209	7219 −6421 798
14.	658 −166 492	762 −479 283	500 −257 243	1257 −990 267	7816 −4769 3047	9872 −9826 46

㉔

1.	$36.28	$25.50	$43.57	$44.94	$24.26
	19.45	9.75	25.64	7.76	35.73
	8.24	8.56	.96	56.32	17.68
	+20.50	+22.47	+4.35	+1.37	+41.05
	$84.47	$66.28	$74.52	$110.39	$118.72
2.	$18.32	$27.87	$22.89	$24.20	$66.60
	1.67	14.66	4.88	1.99	35.79
	.79	12.24	11.91	10.35	43.12
	+24.27	+55.23	+6.17	+83.83	+35.08
	$45.05	$110.00	$45.85	$120.37	$180.59

3. 9 + 5 + 3 + 9 + 6 32 5 + 6 + 6 + 9 + 5 31

4. 4 + 9 + 5 + 6 + 8 32 8 + 6 + 8 + 4 + 5 31

5. 7 + 9 + 2 + 9 + 7 34 4 + 9 + 2 + 8 + 7 30

6. 4 + 2 + 7 + 3 + 8 24 7 + 4 + 6 + 9 + 3 29

㉕

7.	5422	7547	6255	8335	9323	8248
	−3425	−3568	−3569	−3968	−3467	−7489
	1997	3979	2686	4367	5856	759
8.	6385	4424	9570	8255	7323	6111
	−1396	−3539	−6794	−4787	−5789	−4199
	4989	885	2776	3468	1534	1912
9.	4000	6000	9000	7000	5000	8000
	−2975	−2038	−8743	−4186	−4052	−1267
	1025	3962	257	2814	948	6733

㉖

10. 8 + 9 17 15 − 7 8 4 × 9 36 63 ÷ 7 9 5 × 5 25

11. 9 − 4 5 48 ÷ 8 6 5 + 8 13 13 − 4 9 9 + 6 15

12. 7 × 8 56 30 ÷ 5 6 8 × 6 48 14 − 5 9 9 × 7 63

13. 4 + 6 10 18 − 9 9 4 + 7 11 45 ÷ 5 9 9 ÷ 3 3

㉗

1. 40 × 23 920   80 × 12 960   50 × 19 950   90 × 10 900
2. 10 × 74 740   30 × 32 960   70 × 14 980   30 × 60 1800
3. 20 × 68 1360   90 × 11 990   40 × 90 3600   60 × 12 720
4. 60 × 45 2700   70 × 20 1400   80 × 54 4320   50 × 50 2500

㉘

5. 23 × 24 552   14 × 24 336   18 × 12 216   25 × 18 450
6. 12 × 17 204   33 × 32 1056   11 × 69 759   32 × 32 1024
7. 34 × 15 510   22 × 37 814   13 × 33 429   35 × 16 560
8. 16 × 16 256   17 × 14 238   24 × 22 528   15 × 13 195

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9. 26 × 65 1690   59 × 57 3363   73 × 78 5694   96 × 27 2592
10. 18 × 83 1494   65 × 43 2795   38 × 56 2128   83 × 74 6142
11. 37 × 95 3515   94 × 89 8366   74 × 75 5550   19 × 46 874
12. 45 × 92 4140   82 × 49 4018   62 × 89 5518   47 × 63 2961

㉚

13. 364 ÷ 7 52   84 × 39 3276   43 + 58 101   55 − 26 29
14. 96 − 57 39   205 ÷ 4 51 R1   95 − 45 50   95 + 75 170
15. 9 × 304 2736   81 − 64 17   26 × 45 1170   801 ÷ 9 89
16. 86 + 79 165   94 + 94 188   835 ÷ 5 167   7 × 328 2296
17. 13 × 19 247   632 ÷ 8 79   80 − 53 27   66 + 68 134
18. 765 ÷ 6 127 R3   187 × 5 935   47 + 76 123   74 − 39 35
19. 657 ÷ 9 73   85 + 69 154   57 × 65 3705   79 + 36 115

㉛

1. 14 × 36 504 30 × 46 1380 2536 ÷ 8 317 1480 ÷ 5 296
2. 37 × 28 1036 15 × 25 375 2980 ÷ 4 745 2935 ÷ 3 978 R1
3. 25 × 47 1175 68 × 47 3196 2463 ÷ 9 273 R6 3665 ÷ 8 458 R1
4. 42 × 15 630 21 × 81 1701 1904 ÷ 6 317 R2 4338 ÷ 9 482
5. 17 × 93 1581 19 × 40 760 5292 ÷ 7 756 3675 ÷ 5 735

6.	36	58	35	44	79	74	37	42
	28	39	68	25	46	26	99	58
	17	40	34	76	78	83	78	86
	45	27	46	23	45	56	91	19
	+29	+56	+23	+39	+42	+27	+35	+49
	155	220	206	207	290	266	340	254

7.	1795	5566	4000	7541	9090
	−864	−3587	−2584	−7359	−5365
	931	1979	1416	182	3725

㉜

8. 64 × 215 13,760 98 × 125 12,250 56 × $7.69 $430.64
9. 75 × 390 29,250 86 × 304 26,144 43 × $3.98 $171.14
10. 37 × 461 17,057 19 × 159 3021 67 × $2.65 $177.55
11. 29 × 394 11,426 52 × 423 21,996 71 × $5.28 $374.88
12. 61 × 483 29,463 48 × 546 26,208 87 × $9.07 $789.09
13. 93 × 207 19,251 82 × 687 56,334 25 × $5.12 $128.00
14. 59 × 861 50,799 14 × 760 10,640 32 × $8.95 $286.40
15. 28 × 310 8680 53 × 408 21,624 89 × $4.80 $427.20
16. 34 × 723 24,582 74 × 184 13,616 41 × $9.05 $371.05
17. 62 × 879 54,498 91 × 376 34,216 15 × $5.74 $86.10
18. 45 × 803 36,135 72 × 905 65,160 36 × $1.98 $71.28

More Practice

33

1.	2924 +2359 5283	7075 −5276 1799	380 ×7 2660	74 ×25 1850	4483 +5286 9769

2. 328 + 645 + 436 + 366 1775 645 + 547 + 573 + 235 2000

3. $9\overline{)3286}$ 365 R1 $5\overline{)4365}$ 873 $7\overline{)5082}$ 726 $\frac{1}{6}$ of 4170 695

4.	5246 −3366 1880	609 ×48 29,232	2372 +3628 6000	6487 −5690 797	156 ×63 9828

5. 125 × 7¢ $8.75 $7.52 ÷ $.08 94 36 × 9¢ $3.24

6. 372 × 5¢ $18.60 $3.92 ÷ $.07 56 87 × 4¢ $3.48

7. 214 × 6¢ $12.84 $2.64 ÷ $.04 66 49 × 5¢ $2.45

34

8.	1736 ×4 6944	3257 ×6 19,542	2049 ×4 8196	$24.31 ×9 $218.79	$12.50 ×7 $87.50
9.	3287 ×3 9861	3719 ×9 33,471	8346 ×7 58,422	$18.75 ×8 $150.00	$25.09 ×5 $125.45
10.	2097 ×7 14,679	2694 ×8 21,552	9176 ×2 18,352	$19.84 ×6 $119.04	$15.85 ×4 $63.40
11.	1565 ×3 4695	5076 ×9 45,684	1768 ×5 8840	$43.75 ×7 $306.25	$31.78 ×8 $254.24
12.	1306 ×6 7836	3964 ×5 19,820	2500 ×8 20,000	$94.00 ×3 $282.00	$42.85 ×9 $385.65
13.	2364 ×7 16,548	3782 ×4 15,128	1206 ×9 10,854	$21.75 ×6 $130.50	$20.35 ×8 $162.80

㉟

1. 42

17	12	13
10	14	18
15	16	11

2. 78

29	21	28
25	26	27
24	31	23

3. 495

170	145	180
175	165	155
150	185	160

4. 48

17	12	19
18	16	14
13	20	15

5. 162

63	72	27
18	54	90
81	36	45

6. 417

142	135	140
137	139	141
138	143	136

7. 57

22	15	20
17	19	21
18	23	16

8. 192

66	68	58
56	64	72
70	60	62

9. 768

248	240	280
288	256	224
232	272	264

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10.	8 × 1587	12,696	73 × 814	59,422	4715 ÷ 7	673 R4
11.	4 × 4819	19,276	49 × 362	17,738	4905 ÷ 5	981
12.	9 × 5047	45,423	60 × 758	45,480	5635 ÷ 8	704 R3
13.	7 × 3970	27,790	58 × 263	15,254	1865 ÷ 6	310 R5
14.	6 × 2649	15,894	27 × 526	14,202	7371 ÷ 9	819
15.	5 × 7045	35,225	18 × 409	7362	2028 ÷ 4	507

More Practice

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1. 35 + 66 + 73 + 94 + 35 303   610 + 378 + 423 + 926 2337
2. 78 + 48 + 75 + 46 + 53 300   179 + 398 + 242 + 429 1248
3. 56 + 67 + 46 + 57 + 48 274   567 + 146 + 281 + 573 1567
4. 29 + 93 + 87 + 47 + 89 345   899 + 112 + 200 + 358 1569
5. 93 + 36 + 55 + 58 + 96 338   159 + 374 + 112 + 255 900
6. 473 − 255 218   8004 − 4266 3738   5000 − 3185 1815
7. 679 − 384 295   4526 − 2538 1988   3252 − 2893 359
8. 589 − 239 350   6900 − 3573 3327   5845 − 4746 1099
9. 800 − 256 544   3568 − 3542 26   7000 − 6369 631

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10. (7 × 5) + 4 39   5 + (8 × 8) 69   (3 × 5) + 1 16
11. (3 × 7) + 2 23   4 + (6 × 6) 40   (4 × 8) + 3 35
12. (5 × 4) + 3 23   1 + (2 × 9) 19   (7 × 8) + 5 61
13. (9 × 5) + 8 53   6 + (7 × 7) 55   (9 × 9) + 4 85
14. (4 × 7) + 2 30   2 + (6 × 8) 50   (5 × 6) + 4 34
15. (9 × 7) + 6 69   3 + (8 × 9) 75   (8 × 6) + 7 55

㊴

16. $\frac{1}{5}$ of 30 6 $\frac{1}{8}$ of 32 4 $\frac{1}{4}$ of 16 4 $\frac{1}{6}$ of 30 5
17. $\frac{1}{2}$ of 14 7 $\frac{1}{7}$ of 35 5 $\frac{1}{3}$ of 24 8 $\frac{1}{9}$ of 36 4
18. $\frac{4}{5}$ of 40 32 $\frac{2}{5}$ of 15 6 $\frac{3}{5}$ of 25 15 $\frac{5}{6}$ of 42 35
19. $\frac{3}{7}$ of 49 21 $\frac{3}{4}$ of 24 18 $\frac{2}{3}$ of 21 14 $\frac{3}{8}$ of 40 15
20. $\frac{7}{8}$ of 56 49 $\frac{5}{8}$ of 16 10 $\frac{6}{7}$ of 63 54 $\frac{5}{7}$ of 14 10

NUMBER RELATIONSHIPS

Addition Facts. When pupils enter Grade 4, they should know the 100 addition facts and the 100 subtraction facts which were taught in Grade 3. The teacher will find, however, that some pupils have not mastered all these facts. For this reason certain helps are included in Grade 4 for remedial work. For example, important number relationships are taught to enable the pupil to help himself when he forgets the answer to an addition fact. Pages 8 and 9 show the pupil a number of ways he can help himself to get the answer to an addition fact if he has forgotten it. By the aid of these relationships the pupil will soon learn to give the correct answer to any difficult addition fact without needing to count objects.

Subtraction Facts. If the pupil forgets the answer to a subtraction fact, the most effective way to recall it is to relate the subtraction fact to the corresponding addition fact, as shown on pages 16 and 17. In this way the pupil learns how to get the answer to a subtraction fact by a process of thinking with number symbols instead of counting objects, looking up the answer on page 310, or asking the teacher for help.

Multiplication Facts. Some of the most difficult number facts are found among the multiplication facts, so it is important that the pupil be given every aid that will facilitate their mastery. One very important aid in learning the multiplication facts is the commutative principle, which is explained on page 35. The pupil should be taught to use this principle since it greatly shortens the learning of the new facts and aids the recall of facts already studied. Other important aids, given on page 36, show the pupil a quick way to learn all the multiplication facts that have 0 or 1 as one of the factors. Since there are 36 such facts, these aids are well worth knowing. Pages 124 and 125 give some aids in the learning of the multiplication facts by showing the pupil that if he knows the answer to 3×5, he can easily find the answer to 6×5 or 9×5. He can do this by doubling or tripling 15, to find 6×5 or 9×5. Page 197 sums up these number relationships that show the pupil how to help himself with the learning of the multiplication facts.

Division Facts. The multiplication facts are an aid to learning the division facts. For each of the 90 division facts there is a corresponding multiplication fact. The use of this relationship not only shortens the time required to learn the division facts but also provides a most effective means by which the pupil can recall the answer to a division fact if he has forgotten it. See pages 41, 43, 55, 66, 91, 98, etc. The 9 zero facts in division are easily learned by following the generalization given on page 69. Page 199 sums up the number relationships for division that show the pupil how to help himself with the learning of the division facts.

Suggestions to Teachers

PROVISION FOR INDIVIDUAL DIFFERENCES AND REVIEW

Mastering the Number Facts. By the end of Grade 4 the pupils are expected to have a fair mastery of the 390 fundamental facts in addition, subtraction, multiplication, and division. These facts are given on pages 7, 13, 196, and 198. A lack of mastery of any one or more of these facts may seriously handicap a child's progress in arithmetic. Teachers should make every effort to discover the particular facts that each child has not mastered and see that opportunity for extra study is given to him. Facts with answers are given on pages 309–312.

Diagnostic Tests. The facts on pages 7, 13, 196, and 198 are to be given as diagnostic tests to discover which facts are giving trouble. These tests are to be given orally to each individual pupil. When the pupil takes one of these oral tests, the teacher should check all the facts for which the pupil gives unsatisfactory responses. At the end of the test the teacher should give the pupil a list of these particular facts, with instructions to study them carefully. An unsatisfactory response is one which is incorrect or which is given with considerable hesitation, even though it is correct.

Multiplication and Division Facts. Chapter 8 of Grade 3 teaches the multiplication and division facts for the 4's and 5's. For schools not teaching these facts in Grade 3, they are thoroughly taught in Chapters 2 and 3 of Grade 4. This, of course, serves as a review for pupils who studied them in Grade 3.

Additive Subtraction. Teachers wishing to teach subtraction by the additive method will find brief explanations of this method on page 329.

Supplementary Exercises. Pages 313–326 give sets of supplementary practice material that can be used in several ways as the teacher sees fit. References to these sets of exercises have been made on certain pages of the text where it is possible that more practice of a given type may be needed. The teacher can decide when to use this material. The supplementary exercises can also be used for the purpose of review on any given topic where review is desired.

USE OF FOLDED PAPER FOR EXERCISE WORK

To avoid copying exercises in addition, such as those in ex. 1–3 and 9 on page 63, the pupil may write the answers on folded paper. The pupil places the edge of a sheet of paper under ex. 1 on page 63, writing the answers along the edge of the paper. When ex. 1 is finished, the answers should be folded under. The answers to ex. 2 are then written along the folded edge, and so on. It will save time to fold the paper in advance, each fold being about 1 inch wide. The answers to any exercises in addition may be written on folded paper if the teacher wishes. Subtraction exercises may also be answered in the same way.

Additive Method of Subtraction

This page is for teachers who use the additive method of subtraction. The basic idea of additive subtraction is to find a number to add to the lower number (subtrahend) to make the top number (minuend). Borrowing is not required in this method and for that reason the additive method is often easier for pupils to learn than the take-away method. The pages where subtraction is taught are listed below. In each case the model example is explained by the additive method.

Page 28. You have learned that you can subtract 64 from 76 by adding enough to 64 to make 76. Think, "4 ones + 2 ones = 6 ones." Write 2 in ones place. Think, "6 tens + 1 ten = 7 tens." Write 1 in tens place. The answer is 12. If you add 12 to 64 you get 76, so the answer is right.

$$\begin{array}{r}76\\ \underline{64}\\ 12\end{array}$$

Page 29. Think, "8 + 7 = 15." Write 7 in ones place. Carry the 1 ten of 15 to tens column and add it to 2 tens, making 3 tens. Think, "3 + 1 = 4." Write 1 in tens place. The answer is 17. 17 + 28 = 45.

$$\begin{array}{r}45\\ \underline{28}\\ 17\end{array}$$

Think, "5 + 9 = 14." Write 9 in ones place. Add 1 ten to 7 tens, making 8 tens. Think, "8 + 0 = 8." Write 0 in tens place. Think, "1 + 2 = 3." Write 2 in hundreds place. The answer is 209. Add 209 to 175, making 384. This shows the answer is right.

$$\begin{array}{r}384\\ \underline{175}\\ 209\end{array}$$

Page 30. Think, "8 + 7 = 15." Write 7 in ones place. Add 1 ten to 9 tens, making 10 tens. Think, "10 + 2 = 12." Write 2 in tens place. Carry the 1 hundred of 12 tens to hundreds column and add it to 1 hundred, making 2 hundreds. Think, "2 + 2 = 4." Write 2 in hundreds place. The answer is 227. 227 + 198 = 425, so the answer is right.

$$\begin{array}{r}425\\ \underline{198}\\ 227\end{array}$$

Think, "5 + 5 = 10." Write 5 in ones place. Add 1 ten to 2 tens, making 3 tens. Think, "3 + 7 = 10." Write 7 in tens place. Add 1 hundred to 1 hundred, making 2 hundreds. Think, "2 + 1 = 3." Write 1 in hundreds place. The answer is 175. 175 + 125 = 300.

$$\begin{array}{r}300\\ \underline{125}\\ 175\end{array}$$

Page 189. Think, "6 + 7 = 13." Write 7 in ones place. Add 1 ten to 9 tens, making 10 tens. Think, "10 + 8 = 18." Write 8 in tens place. Add 1 hundred to 2 hundreds, making 3 hundreds. Think, "3 + 9 = 12." Write 9 in hundreds place. Add 1 thousand to 2 thousands, making 3 thousands. Think, "3 + 1 = 4." Write 1 in thousands place. The answer is 1987. 1987 + 2296 = 4283, so the answer is right.

$$\begin{array}{r}4283\\ \underline{2296}\\ 1987\end{array}$$

Think, "5 + 5 = 10." Write 5 in ones place. Add 1 ten to 6 tens, making 7 tens. Think, "7 + 3 = 10." Write 3 in tens place. Add 1 hundred to 7 hundreds, making 8 hundreds. Think, "8 + 2 = 10." Write 2 in hundreds place. Add 1 thousand to 2 thousands, making 3 thousands. Think, "3 + 1 = 4." Write 1 in thousands place. The answer is 1235. 1235 + 2765 = 4000, so the answer is right.

$$\begin{array}{r}4000\\ \underline{2765}\\ 1235\end{array}$$

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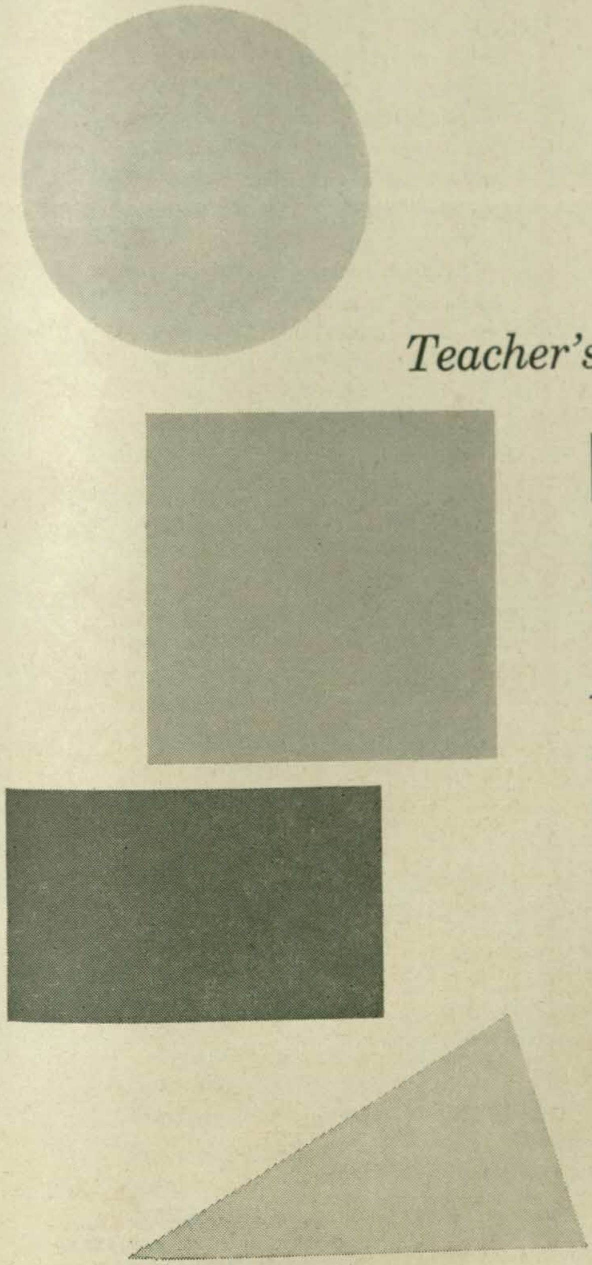

Teacher's Guide and Key for

BUILDING INTEREST

American Arithmetic
Second Edition
Grade 4

CLIFFORD B. UPTON
KENNETH G. FULLER

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Introduction

Use of This Guide. This Guide, together with the Upton-Fuller *American Arithmetic, Second Edition, Grade 4, Building Interest*, offers to the teacher a course in modern methods of teaching arithmetic in Grade 4. The Guide presents the principles of teaching, while *American Arithmetic, Grade 4* illustrates these principles through the actual materials of instruction. This combination provides a more comprehensive discussion of methods in arithmetic than is found in the usual methods text.

The Guide gives suggestions and helps on the teaching of each page of *American Arithmetic, Grade 4* and often refers to specific exercises in the text. To use the Guide successfully, you should study carefully each exercise or explanation in the text to which reference is made in the Guide.

Since a thorough acquaintance with a textbook helps the teacher in using it effectively, certain outstanding features of this series of books, and of *American Arithmetic, Grade 4* in particular, are given below.

Philosophy Underlying These Books. The objectives of the *American Arithmetics* are simply stated:

(1) To teach pupils properly to interpret and to solve the problems of everyday life that involve quantitative data

(2) To teach pupils to understand our number system and the four fundamental processes with whole numbers, fractions, and decimals

(3) To develop in pupils sufficient skill in computation to enable them to solve the problems of everyday life with reasonable speed and accuracy

The attainment of these objectives comes *through insight and intelligent understanding* rather than through the blind following of rules and mechanical procedures.

Meaning and Understanding. Meaning and understanding in arithmetic go much farther than using objects in the primary grades to make numbers meaningful, or explaining the process of regrouping in subtraction. Meaning and understanding, properly treated, must pervade all the work in arithmetic throughout the elementary school. The constant aim of this series of texts is to teach arithmetic so that pupils understand and enjoy it. Throughout these books special attention is given to the following features:

1. Basic Concepts and Terms of Arithmetic. The meanings of fundamental concepts relating to whole numbers, fractions, and decimals, as well as the definitions of the technical terms of arithmetic, are explained with unusual clarity.

2. Comprehension of the Fundamental Processes. This feature includes clear explanations of such topics as carrying and regrouping, multiplying by a 2-figure multiplier, and finding a fractional part of a number.

3. Meaningful Processes through Motivating Problems. In these arithmetics each new topic or process is made meaningful through a motivating problem related to the interests of the pupils. This method shows why the new process is needed.

4. Fundamental Principles. Fundamental principles of arithmetic are simply explained and applied throughout this series of books. These principles replace arbitrary rules.

5. Meaningful Problems. All problems and projects relate to the interests and experiences of children and are written in language that they can understand.

6. Our Number System. The principles underlying our number system are emphasized in each book of the series.

Number Relationships. The fundamental number facts in addition, subtraction, multiplication, and division are the *foundation stones* of all arithmetic. These facts are supposed to be learned in Grades 3 and 4, but in every school one still finds pupils in Grades 5 through 8 who are not sure that 8 and 9 are 17 or that 7 times 9 equals 63. Defects like these are a serious hindrance to all subsequent work in arithmetic.

The reason for doubt on the part of many pupils is that these facts are usually taught solely by the *drill and memorize* technique. Such technique consists of some preliminary use of objects, in which the pupil discovers the answer to each fact, after which he is expected to *memorize* it. In this procedure, when the pupil forgets the answer to a fact, he has no resource *within himself* by which to find it quickly other than to look it up, to count objects again, or to be told the answer by the teacher. In the *American Arithmetics* such inefficiency in learning the basic facts is impossible. Instead, after preliminary work with objects, the pupil is shown how to use *number relationships* to enable him to find the answer quickly *through his own thinking*. This procedure makes it unnecessary for the pupil to depend upon counting or upon the teacher to tell him the right answer. The learning of the fundamental number facts through the aid of *number relationships* is *the most effective method* yet devised for mastering the facts.

An illustration of the use of number relationships in learning new addition facts will now be given. The pupils learn easily the doubles, such as 5 + 5, 7 + 7, and 8 + 8. Once they learn these doubles, it is an easy matter for them to learn other addition facts that are closely related to the doubles. For example, since they know that 5 + 5 are 10, they can easily see that 5 + 6 are 11. Likewise, the pupils who know that 7 + 7 are 14 readily see that 7 + 8 are 15. In this way they learn several of the more difficult facts, such as 5 + 6 are 11, 6 + 7 are 13, 7 + 8 are 15, and 8 + 9 are 17, along with their reverses. These facts are ordinarily considered very difficult. The work is developed on pages 44–45 of *American Arithmetic, Grade 3* and is explained also in the remedial section, page 107, of this Guide. You may thus turn to this section for any necessary remedial work.

Another important group of addition facts consists of those that have 9 as one of the numbers, such as 9 + 7, 9 + 6, and 9 + 5. These facts have usually been considered as among the most difficult of the addition facts; but by the use of number relationships, they are easily learned. By grouping objects, the pupil is shown that a fact like 9 + 7 is the same as 10 + 6, or 16. This result is reached by taking 1 from the 7 and adding it to the 9 to make 10. Thus 9 + 7 becomes 10 + 6, or 16. In this way the pupils easily see that adding 9 to another number is the same as taking 1 from the other number and adding 10 to the result. The use of this relationship, together with the one relating to doubles, covers 20 facts in all, these 20 being the most difficult of all the addition facts. Other relationships are applied to the remaining facts. All this work is covered in Chapter 2 of *American Arithmetic, Grade 3*. It is also described in the remedial section of this Guide.

The subtraction facts also are learned by relating each fact to its corresponding addition fact, as shown on page 17 of *American Arithmetic, Grade 4*. This relationship should be used in remedial work in Grade 4. Another important relationship is the commutative principle, which is helpful in learning both the addition and the multiplication facts. See pages 8 and 35 of *American Arithmetic, Grade 4*. In like manner, the division facts are easily learned by relating each fact to its corresponding multiplication fact, as shown on pages 42, 43, 67, 99, 130, 153, 172, and 180 of *American Arithmetic, Grade 4*.

Problem Solving and Projects. The work on problem solving in these texts incorporates the results of extensive researches on this subject. Such researches have shown that one-step problems can be classified into a limited number of *thought patterns*, representing all the types of quantitative thought that are possible in connection with each of the four fundamental operations. The problems in *American Arithmetic, Grade 4* include all the thought patterns suitable for this grade. In subtraction, for example, there are 8 thought patterns which are used or illustrated in this book; see pages 12, 14, 15, 108, and 185. Each of these thought patterns is representative of hundreds of problems, all similar to the pattern in thought and differing from it only in language. When a pupil becomes acquainted with these 8 subtraction patterns, he has covered every type of subtraction problem he will encounter in Grade 4. Thought patterns covering addition, multiplication, and division also are presented; see pages 5, 23, 58, 59, 75, 82, and 106 of *American Arithmetic, Grade 4*.

All the problems in *American Arithmetic, Grade 4* relate to the experiences and interests of children. These problems are carefully graded and limited to one-step and two-step problems. A number of special features in problem solving are incorporated in *American Arithmetic, Grade 4*, including a series of problem tests, one such test appearing at the end of each chapter.

Many challenging projects relating to birds, animals, travel, history, and school activities are provided in this book. See pages 4, 26, 44, 53, 101, 106, 117, 121, 127, 134, 163, 167, 216, 250, 251, and 260.

Vocabulary. The vocabulary in each of these arithmetics has been controlled with unusual care. In *American Arithmetic, Grade 4*, for example, the general and technical vocabulary is limited to approximately 1000 words, of which a high percentage is recognized on the basis of core lists suitable for Grade 4. In contrast, many basal readers for the fourth grade have vocabularies at least twice as large. It is thus seen that reading difficulties have been reduced to a minimum in *American Arithmetic, Grade 4*.

Maintenance Program. Full provision has been made to maintain skills in computation and problem solving as follows:

1. **Reteaching of Important Topics.** Each book in this series devotes the first one or two chapters to a review and a reteaching of the important topics of the work of the preceding year.

2. **Diagnostic Tests.** Diagnostic tests with keyed references to remedial exercises are given at the end of each chapter. See pages 50, 52, 88, 120, 161, 162, 202, 238, 276, and 307 of *American Arithmetic, Grade 4*.

3. **Problem Tests.** A problem test designed to test the pupils' ability in problem solving is given in each chapter. See pages 51, 87, 119, 160, 201, 237, 275, and 306.

4. **Chapter Reviews.** Reviews covering the new work of each chapter are provided. See pages 49, 86, 118, 159, 200, 236, 274, and 305.

5. **Oral and Written Reviews.** Reviews covering important topics previously taught are frequently given. See pages 25, 31, 37, 63, 79, 102, 141, 188, 192, 232, 233, 249, 259, 269, 293, 298, 300, and 302.

6. **Mixed Practice.** Computational practice on the four fundamental processes is amply covered and provided for. See pages 39, 71, 94, 105, 107, 116, 128, 146, 151, 166, 179, 212, 222, 229, 244, 254, 265, 271–273, 287, and 296.

7. **Maintenance of Arithmetic Vocabulary.** Reviews which give an opportunity to check understanding of words essential to arithmetic are provided. See pages 83, 114, 135, 208, 224, 265, and 286.

Use of the Textbook. Before starting the year's work, read "Suggestions to Teachers" on pages 327–329 of *American Arithmetic, Grade 4*. These suggestions contain valuable teaching hints and give various helps for teaching specific pages of the text. In teaching *American Arithmetic*, *Grade 4*, follow the textbook, page by page. Do not skip around in the book, teaching the topics in a different order from that in which they are presented. Arithmetic is a *sequential subject*, which means that each topic must be taught in its proper order because of the close interdependence of the various topics. For example, single carrying in addition must precede double and triple carrying, multiplying a number by a 1-figure number must come before multiplying by a 2-figure number, division without carrying must be taught before division with carrying. Teaching the successive topics in arithmetic is much like forging the links of a chain. If one of the links is defective, the chain breaks. If a child is absent from school when a certain topic is taught, he may be handicapped on his return because the topic he missed may be essential to his understanding of the new work.

This emphasis on the importance of presenting the topics of arithmetic in their sequential order applies with particular force to arithmetic. Other school subjects, such as history, English, and geography, are not as highly sequential in nature as arithmetic. In geography, for example, a pupil who is absent from school when a study of the New England States is made is not handicapped later in his study of the North Central States. On the other hand, his absence may seriously affect his progress in arithmetic.

The fact that arithmetic is a sequential subject makes it very important for you to try to learn *at frequent intervals* the difficulties each pupil encounters, rather than to let these difficulties accumulate. By the aid of the diagnostic tests and the other tests given in the text, find out each pupil's difficulties as the work progresses; then take the necessary steps to correct them. If the pupil's difficulties with arithmetic are permitted to accumulate, he will become more uncertain of his arithmetic skills in each successive grade.

Key. All answers are given on the appropriate pages in the Guide. These answers will be a convenience for those teachers not using the annotated edition, who may prefer to transfer them to the textbook pages for ready reference. As a further convenience, two-part examples are worked out throughout the book.

Chapter 1

Aims of Chapter I. The major aims of Chapter 1 are to reteach and review the basic skills in addition, subtraction, multiplication, and division as taught in Grade 3. Specifically, these aims are to:

1. Reteach the tens nature of our number system and place value to five places.
2. Review what actually takes place when numbers are added, subtracted, multiplied, or divided.
3. Reteach the relationship which exists between addition and subtraction.
4. Reteach the relationship which exists between multiplication and division.
5. Reteach the relationship which exists between addition and multiplication.
6. Review the basic addition and subtraction facts.
7. Reteach adding by endings with and without bridging.
8. Reteach column addition involving carrying and column addition of dollars and cents.
9. Reteach subtraction of large numbers with and without regrouping.
10. Reteach the multiplication facts of 2's and 3's and their reverses.
11. Reteach multiplication with 1-figure numbers, with and without carrying.
12. Reteach the division facts of 2's and 3's.
13. Reteach the division of 3-figure numbers by 2 and by 3 without carrying or remainders.
14. Reteach the multiplication facts of 1's and 0's by generalizations.
15. Review and extend the reading of a clock and measures involving hours and days.
16. Reteach linear measures of foot, inch, and yard.
17. Reteach the meaning of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{3}$ of an object.
18. Review division dealing with $\frac{1}{2}$ and $\frac{1}{3}$ of a number.
19. Review important problem patterns in subtraction and addition.

Page 1

Aim: To relate to arithmetic the summer experiences of pupils

Suggestions: *Arithmetic is all around us and is therefore nothing to be feared.* The development of this theme, on which *American Arithmetic, Grade 4* opens, will help children to enjoy arithmetic. The problems found on this page are *only the beginning* of an entire series which the class can develop from the summer experiences of boys and girls. Encourage members of the group to write on the board problems from their own summer experiences. They will enjoy an activity such as the collection of items connected with their summer arithmetic experiences or the construction of a large poster entitled "How I Used Arithmetic This Summer."

Key: **1.** 12 planes + 3 planes = 15 planes. **2.** 75 balloons + 90 balloons = 165 balloons. **3.** 30 + 12 + 25 = 67. **4.** 19 fish − 6 fish = 13 fish.

Pages 2–4

Aims: To review the measures relating to time; to extend the reading of a clock to short intervals

Suggestions: The class might begin by studying a large model of a clock. Various times in the school day could be shown on the clock face. In the initial part of the review work, set the hands of the clock to show the half or quarter hour. Then introduce the new learning by moving the hands to five-minute and finally one-minute positions. Numerous manufacturers produce classroom clocks for this purpose. At this point you might refer to the section on Audio-Visual Aids at the end of this Guide. When the pupils have completed the exercises on pages 2 and 3, introduce the subject of television programs by asking how we know when certain programs are on the air. Your questions will lead to further work on telling time and encourage a collection of printed TV or radio programs. When the work on page 4 is introduced, have available some plane, bus, or train timetables; such printed schedules are graduated to the minute rather than to the five-minute or the fifteen-minute interval. Some pupils will have taken trips during the summer and may be familiar with the reading of timetables.

Key: Page 2 **1.** 20 past 8. **2.** Minutes; 5 minutes; 5 minutes. **3.** 60 minutes. **4.** 7 o'clock, 35 minutes past 8, 5 minutes past 6, 15 minutes past 8. **5.** 60 minutes; 1 hour.

Page 3 **7.** Eight fifteen; quarter past eight. **8.** 5:15. **9.** 11:45. **10.** 10:30. **11.** 12:10. **12.** 6:40. **13.** 8:25. **15.** Twelve hours; twelve hours; twenty-four hours. **17.** Hr. **18.** 7 da., 10 min., 3 hr. **19.** 9 hr., $\frac{1}{2}$ hr., 5 da. **20.** 8 da., 4 min., 8 hr.

Page 4 **11.** 9:18. **12.** 5:42, 2:29, 4:37, 12:08

Page 5

Aims: To reteach the meaning of addition; to review the basic addition facts

Suggestions: After a brief discussion of the fact that addition means the combination of one or more objects with other objects of the same kind, direct the attention of the class to the words in ex. 1, set in bold-faced type. Write these words on the board and let the pupils discuss them. Some teachers begin at this point to build a large vocabulary chart for the class. Such a chart should contain the technical words used in the fourth grade. The words *and*, *plus*, *are*, *equals*, and *addition fact* should be written on the chart, together with an addition and an equals sign. The basic meaning of addition can be illustrated by referring to some of the addition facts in ex. 4–6, and by asking a question such as, "What are we adding or putting together in the addition story 6 + 3 = ?" or "Is 9 more than either 6 or 3?" After ex. 4–6 have been reviewed orally, extend the practice in addition by using flash cards or by turning to page 313 at the back of the text. Be sure to remind the pupils that the addition stories written in ex. 4–6 can appear also in vertical form, as shown in red in the upper right-hand corner of page 5.

Page 5 is the first page which refers to the "More Practice" pages. See page 328 of the text, "Supplementary Exercises," for an explanation of how to use these pages.

Workbook Reference: Upton-Uhlinger: Arithmetic Workshop, Book 4, page 2 (published by American Book Company)

Key: **2.** 8¢ + 5¢ = 13¢; 13¢; 13. **3.** 4 apples + 3 apples = 7 apples; 3 apples + 4 apples = 7 apples; 7; 7. **4.** 9, 12, 11, 8, 8. **5.** 11, 12, 10, 10, 14. **6.** 13, 13, 16, 17, 13.

Page 6

Aim: To reteach addition thought patterns

Suggestion: The vocabulary used in these word problems is very simple, and all problem situations are readily known to fourth-grade pupils. Allow the class to complete this work while you observe the way the pupils "attack" the problems.

Key: **1.** 5 + 4 = 9 (children). **2.** 9¢ + 8¢ = 17¢. **3.** 9 hens + 4 hens = 13 hens. **4.** 8 flowers + 7 flowers = 15 flowers. **5.** 5¢ + 8¢ = 13¢. **6.** 5 dolls + 2 dolls = 7 dolls. **7.** 7 tickets + 5 tickets = 12 tickets.

Page 7

Aim: To review the 100 basic addition facts

Suggestions: This test, which requires rapid responses, should be given orally. The 100 basic addition facts, which are probably the most used of all the number facts in arithmetic, should have been learned by the end of the third year. One of the most important things to do at the beginning of the year is to determine how well the pupils know them. Pupils who fail to give the answers quickly and accurately need further practice. It might be helpful to use flash cards, each card containing one basic fact. After showing a card, you might place it in one of three piles according to the response — correct, delayed, or incorrect. Pupils who hesitate or give incorrect responses require individual attention.

Key: **1.** 9, 17, 9, 12, 12, 3, 8, 10, 11, 11. **2.** 8, 8, 9, 9, 3, 10, 9, 5, 6, 7. **3.** 14, 13, 4, 10, 12, 13, 3, 2, 15, 12. **4.** 11, 12, 1, 5, 18, 5, 13, 14, 0, 10. **5.** 9, 10, 15, 4, 8, 11, 2, 6, 8, 1. **6.** 3, 9, 7, 14, 8, 8, 13, 14, 10, 11. **7.** 13, 5, 5, 5, 4, 16, 8, 9, 16, 7. **8.** 6, 7, 13, 6, 15, 2, 14, 7, 12, 9. **9.** 16, 7, 10, 12, 4, 10, 17, 6, 8, 6. **10.** 11, 7, 15, 7, 6, 11, 9, 4, 11, 10.

Pages 8–9

Aim: To reteach the relationships which exist between certain addition facts

Suggestions: The teaching program in addition facts requires a full understanding of the relationship of one fact to another. The relationships and generalizations for the addition facts, presented in *American Arithmetic, Grade 3,* are reviewed on these pages. Pupils *must* be led to realize that there is always a way to *work out* for themselves an answer to an addition fact. Naturally, a mental operational pattern is better than a return to counting objects. At this point, pupils who reveal a deficiency in any of the addition facts should be encouraged to build some small flash cards for their own use. Always note on each pupil's individual progress card the facts on which he will be working during the next few days. This record of individual differences in arithmetic will continue to develop as the school year unfolds.

Workbook Reference: Arithmetic Workshop, Book 4, page 1

Key: Page 8 **3.** 12; 12. **4.** 7; 9; 8; 10. **5.** 8 shells; 5; 9.

Page 9 **8.** $6 + 7 = 6 + 6 + 1 = 12 + 1 = 13$ and $7 + 6 = 13$; $7 + 8 = 7 + 7 + 1 = 14 + 1 = 15$ and $8 + 7 = 15$; $8 + 9 = 17 = 8 + 8 + 1 = 16 + 1 = 17$ and $9 + 8 = 17$. **9.** 15, 13, 17. **10.** $9 + 4 = (9 + 1) + (4 - 1) = 10 + 3 = 13$. **11.** 16, 14, 12, 13. **13.** 14, 12, 11, 15.

Page 10

Aim: To provide oral practice on the basic addition facts whose sums are 11 or more

Suggestions: This work is to be done mentally and quickly. Skip around the class. The horizontal form of the addition facts is shown in ex. 14–20. This page combined with page 7 provides excellent practice material for the addition facts.

Key: **1.** 14, 15. **2.** 16, 17. **3.** 4, 14. **4.** 6, 16. **5.** 10, 11. **6.** 17, 17. **7.** 12, 13. **8.** 2, 12. **9.** 4, 14. **10.** 5, 15. **11.** 13, 13. **12.** 4, 14. **13.** 1, 11. **14.** 18, 15, 12, 14, 11. **15.** 11, 13, 17, 14, 16. **16.** 15, 13, 13, 14, 15. **17.** 11, 16, 11, 12, 13. **18.** 13, 12, 16, 12, 12. **19.** 14, 14, 12, 15, 10. **20.** 17, 13, 12, 11, 11.

Page 11

Aim: To reteach single column addition without carrying, in which only basic facts are used

Suggestion: This is the simplest type of column addition. Children are encouraged to add up, and to check by adding down. Only the basic facts occur in these examples. Ex. 8–11 should be done orally so that pupils will again become accustomed to mental arithmetic.

Key: **1.** 6 days + 4 days = 10 days. **2.** 4¢ + 5¢ + 3¢ = 12¢. **3.** \$3 + \$1 = \$4. **4.** 3 flowers + 4 flowers + 5 flowers = 12 flowers. **5.** 9, 14, 14, 10, 15, 16, 13, 11, 11. **6.** 10, 11, 15, 13, 14, 13, 12, 13, 13. **7.** 10, 11, 8, 12, 11, 10, 12, 11, 12. **8.** 10, 12, 12. **9.** 12, 15, 12. **10.** 10, 9, 13. **11.** 14, 11, 11.

Page 12

Aims: To reteach the meaning of subtraction; to review the basic subtraction facts

Suggestions: Use the suggestions provided for page 5. Add the arithmetic words *minus*, *take away*, *subtract*, and *subtraction fact* to the vocabulary chart begun in connection with page 5.

Workbook Reference: Arithmetic Workshop, Book 4, pages 5 and 6

Key: **2.** 8 stars; 8 stars. **3.** 3 stars; 3 stars; 3. **4.** 5, 5, 8, 9, 8, 8, 8. **5.** 3, 4, 9, 7, 6, 7, 7. **6.** 9, 7 4, 6.

Page 13

Aim: To review the 100 basic subtraction facts

Suggestions: Proceed in a manner similar to that suggested for the lesson on page 7. Be sure to check all answers on which the pupils hesitated or which they had to think out by referring back to the corresponding addition fact.

Key: **1.** 1, 0, 3, 4, 8, 4, 6, 5, 9, 4. **2.** 3, 7, 0, 1, 2, 1, 9, 5, 6, 9. **3.** 1, 7, 0, 1, 6, 9, 3, 8, 8, 6. **4.** 4, 4, 0, 1, 1, 2, 9, 6, 5, 7. **5.** 4, 3, 3, 0, 4, 6, 4, 5, 4, 5. **6.** 1, 2, 3, 0, 7, 6, 9, 9, 8, 7. **7.** 5, 5, 5, 2, 2, 3, 6, 7, 8, 3. **8.** 0, 2, 1, 3, 2, 8, 8, 2, 7, 7. **9.** 5, 0, 4, 8, 0, 7, 7, 9, 9, 3. **10.** 2, 5, 6, 1, 0, 9, 2, 8, 8, 6.

Pages 14–15

Aim: To review six important problem patterns in subtraction

Suggestions: On page 14, three problem patterns are presented, each one set off in a box. The first of these patterns reads as follows: *Suppose you know the number of things there were at first. You also know the number of things taken away. You subtract to find how many are left.* There are hundreds of subtraction problems that conform to this pattern; ex. 1 and 2 on this page are examples. Each of these problems asks what is left. Ex. 2 asks, "How much change did Ann get?" but this is merely another way of asking how much was left. Ex. 3 and 4 represent another subtraction pattern which is stated in the second box on this page. Hundreds of other similar problems could easily be made. Ex. 5 and 6 represent a third pattern, which is stated in the third box. On page 15 three other subtraction patterns are given. The important thing about all these patterns is that each one provides a set of conditions requiring subtraction to find an answer. In this way the process of subtraction becomes more meaningful and is recognized as a process having a wide variety of applications. While each pattern can present hundreds of problems, the patterns themselves are limited in number. In fact, there are only eight different subtraction patterns that the pupils will study in this book. By becoming acquainted with these eight patterns and their meanings, the pupil can grasp the subtraction process, as applied to problem solving, that is of the greatest value. These eight patterns cover practically all the one-step subtraction problems that the pupil will *ever* encounter. The use of problem patterns as an aid to the teaching of problem solving is one of the outstanding features of this book.

Key: Page 14 **1.** 14 apples − 9 apples = 5 apples. **2.** 10¢ − 8¢ = 2¢. **3.** 12 cookies − 3 cookies = 9 cookies. **4.** 15 tickets − 7 tickets = 8 tickets. **5.** 14 cards − 6 cards = 8 cards.

Page 15 **6.** 14 − 8 = 6 (boys). **7.** 11 − 5 = 6 brown hens. **8.** 12 years − 8 years = 4 years. **9.** $11 − $9 = $2. **10.** 13 rabbits − 6 rabbits = 7 rabbits. **11.** 60 inches − 54 inches = 6 inches.

Pages 16–17

Aim: To show the pupil how to help himself if he forgets the answer to a subtraction fact

Suggestions: When a subtraction combination like the one at the right is read in take-away form, you say "2 from 7 is what?" When it is read in additive form, you say "2 and what are 7?" Therefore, the additive form "2 and what are 7?" is closely related to the addition fact "2 and 5 are 7." If a pupil knows that 2 and 5 are 7, it is easy for him to answer the question "2 and what are 7?" In other words, if a pupil knows the addition facts, he can quickly give the answers to the additive forms of the subtraction facts. At this point you may wish to refer to page 329 for a brief explanation of the additive method of subtraction.

$$\begin{array}{r}7\\-2\\\hline\end{array}$$

Suppose a pupil forgets the answer to the fact at the right. Tell him to look at the lower number 7 and ask, "7 and what are 15?" When the pupil responds, "7 and 8 are 15," he then sees that 7 from 15 is 8. In other words, the pupil finds the answer to a subtraction fact by expressing the fact in additive form. Success in using this method requires that you teach the pupil how to express combinations like those at the right in additive form. In each case, have the pupil begin with the lower number and ask these questions: "6 and what are 13?" "9 and what are 17?" "8 and what are 15?" Ex. 1 and 2 on page 17 are further illustrations of the thought processes through which the pupil must go. Ex. 3–9 give practice in finding the missing numbers which become the answers to certain subtraction facts.

$$\begin{array}{r}15\\-7\\\hline\end{array}$$

$$\begin{array}{r}13\\-6\\\hline\end{array}\quad\begin{array}{r}17\\-9\\\hline\end{array}\quad\begin{array}{r}15\\-8\\\hline\end{array}$$

Key: Page 16 **1.** 3 dots; 5 dots; 8 dots; 5 dots; 5 dots; 5. **2.** 3 dots; 3 dots; 3. **4.** 4 pencils; 5 pencils; 9 pencils. **5.** 9, 5. **6.** 9; 9 dots; 9; 6. **7.** 15, 9. **8.** 15, 15, 6, 9.

Page 17 **1.** 5; 5; 5. **2.** 8; 8. **3.** 6, 6. **4.** 9, 9. **5.** 8, 8. **6.** 8, 8. **7.** 7, 7. **8.** 5, 5. **9.** 8, 8. **10.** 12 pumpkins − 8 pumpkins = 4 pumpkins. **11.** 18 stamps − 9 stamps = 9 stamps. **12.** \$5 − \$3 = \$2.

Pages 18–20

Aim: To reteach the tens nature of our number system and place value through thousands

Suggestions: Open the period by reminding the pupils that there are only 10 figures in our number system (0–9). When it becomes necessary to write a number greater than 9, a combination of these ten figures must be used. Eleven is expressed by two 1's; fourteen by a 1 and a 4; sixteen by a 1 and a 6. This teaching leads into a discussion of the tens nature of any number between 11 and 19. Extend the discussion to the twenties, the thirties, and so on. A place pocket chart with some tens and ones will help pupils visualize some of our "teen" numbers. In ex. 5, page 18, the counting board used in Grade 3 will help; and in ex. 8 the class should take time to understand thoroughly the different ways the number 135 can be read. At this time ask, "How many hundreds are in the number 135?" (one) "How many tens are in the number 135?" (thirteen) "How many ones are in the number 135?" (one hundred thirty-five). Ex. 14–16 on page 19 test the pupils' understanding of our number system; ex. 18–20 extend place value through the thousands. For teaching place value of this magnitude, you may wish to use a vertical acabus. Page 20 provides numerous exercises dealing with place value. *At this point stop long enough to make certain that all pupils* thoroughly understand place value, zero, and the tens nature of our number system.

Key: Page 18 **3.** 2 tens and 6 ones. **4.** 4 tens and 7 ones; 6 tens and no ones. **6.** 87, 8 tens and 7 ones; 56, 5 tens and 6 ones; 14, 1 ten and 4 ones. **7.** 38, 3 tens and 8 ones; 92, 9 tens and 2 ones; 16, 1 ten and 6 ones. **8.** 100, 105, 110, 115, 120, 125, 130, 135; 1 hundred, 3 tens, 5 ones.

Page 19 **10.** 6 hundreds, 4 tens, 5 ones; 3 hundreds, 5 tens, 6 ones; 9 hundreds, 9 tens, 9 ones; 2 hundreds, no tens, no ones; 1 hundred, 6 tens, 4 ones; 5 hundreds, 2 tens, 7 ones. **11.** 812, 415. **12.** 540, 658. **13.** 907, 284. **14.** 10; 99. **15.** 100; 999. **16.** 347; 743. **17.** 400, 500, 600, 700, 800, 900, 1000. **20.** One thousand four hundred, or fourteen hundred; one thousand nine hundred, or nineteen hundred; one thousand six hundred, or sixteen hundred; one thousand eight hundred, or eighteen hundred; one thousand five hundred, or fifteen hundred; one thousand three hundred, or thirteen hundred; one thousand seven hundred, or seventeen hundred; one thousand two hundred, or twelve hundred.

Page 20 **4.** One thousand eight hundred forty-two, or eighteen hundred forty-two; one thousand six hundred, or sixteen hundred; one thousand seven hundred three, or seventeen hundred three; one thousand nine hundred forty-seven, or nineteen hundred forty-seven; one thousand four hundred ninety-two, or fourteen hundred ninety-two. **5.** 4000, 5000, 6000, 7000, 8000, 9000. **7.** Six thousand four hundred fifty-eight, or sixty-four hundred fifty-eight; three thousand two hundred seven, or thirty-two hundred seven; four thousand seven hundred, or forty-seven hundred; one thousand nine hundred sixty, or nineteen hundred sixty; one thousand eight hundred seventy-five, or eighteen hundred seventy-five; one thousand nine hundred fifty-eight, or nineteen hundred fifty-eight. **8.** 1000. **9.** 9999.

Page 21

Aim: To reteach simple column addition with no carrying or adding by endings

Suggestions: These examples are very easy addition since no "unseen" numbers occur. Any pupils who experience difficulty at this level should turn to the practice work on page 314 before continuing to the next page. In this work the pupil should begin at the bottom of the column and add up and check his work by beginning at the top of the column and adding down. If the two sums are alike, the work is right. Some educators have questioned the relative advantages of adding *up* over adding *down*. Such a discussion is far more academic than practical because a good computer does both. Bookkeepers, and others who are adding constantly, usually begin at the bottom of the column and add up, checking the work by adding down. The important thing, therefore, is to add in both directions, first up and then down, in order to verify the total.

Key: **3.** 56, 69, 139, 139, 789, 546, 798. **4.** 27, 119, 75, 134, 698, 573, 567.

Page 22

Aim: To reteach adding by endings

Suggestions: One of the greatest causes of failure in upper-grade addition work is the inability of pupils to add by endings quickly and accurately. Long columns of figures demand a facile knowledge of addition facts which involve adding by endings. The addition facts 2 + 6, 12 + 6, and 22 + 6 are shown at the top of this page. This type of adding by endings is relatively easy to master. However, such facts as 7 + 8, 17 + 8, 27 + 8, and 37 + 8 are more difficult. Some teachers make flash cards of the adding-by-endings facts with special emphasis on those that require bridging. You, of course, realize that practice by endings is further practice in the 100 fundamental addition facts. As the pupils go deeper into multiplication and column addition, they encounter more and more of these facts. The facts found on this page serve only as a starting point in this review. Each week a few minutes of class time might be allotted to a comprehensive review of all adding-by-endings facts.

Key: **1.** 28. **2.** 38, 48, 58, 68. **3.** 9, 19, 29, 39, 49. **4.** 8, 18, 48, 88, 98. **6.** 14, 24, 34, 84, 94. **7.** 13, 53, 73, 93, 103. **8.** 13, 43, 83, 93, 103. **9.** 39, 66, 73, 91.

Page 23

Aim: To reteach single column addition by endings

Suggestions: Pupils who do not readily acquire the skill of adding by endings need much practice at this point. Flash cards of varying difficulty (with the facts shown vertically) will greatly assist pupils in "seeing" the answer. Besides the column addition examples, the word problems at the top of the page develop an addition thought pattern.

Key: **2.** 5¢ + 8¢ + 3¢ = 16¢. **3.** 6¢ + 9¢ + 7¢ + 5¢ = 27¢. **4.** 22, 13, 21, 17, 19, 14, 18, 18. **5.** 26, 27, 16, 20, 23, 18, 26, 19.

Page 24

Aim: To reteach carrying in addition

Suggestions: The pupils must be shown this carrying operation in actual practice. For instance, to illustrate the first example, ask one pupil to step to the front of the room and hold up 6 bundles of sticks (10 to a bundle) and 5 single sticks, to represent the number 65. Ask another pupil to hold up 5 bundles of sticks and 8 single sticks, to represent the number 58. Now ask the class whether you collect the single sticks first or the bundles. The class will see that you should collect the single sticks first. In so doing, you have 13 sticks; but as you can write only a single figure, the 13 sticks will be regrouped into a bundle of ten plus 3 single sticks. Allow another class member to hold the 3 sticks, and ask the class what the bundle of ten sticks represents. Now collect the 5 bundles of 10 sticks and the 6 bundles of 10 sticks and you have 11 bundles, together with the bundle that you are carrying. All together you have 12 bundles of 10 sticks each. As there are no more sticks to collect from the first two pupils, you have 12 bundles of 10 sticks (or 1 bundle of a hundred, and 2 of ten) and 3 single sticks. Now, do the example in writing. Adding 8 and 5 to get 13, write the 3 and *indicate that you are carrying a 10;* add the 1 ten to 5 tens, and this to 6 tens, which gives 12 tens. Change 10 tens to 1 hundred and write the 1 hundred, 2 tens. Have the pupils similarly discuss or demonstrate the other examples on this page. Notice that ex. 3 requires double carrying.

Workbook Reference: Arithmetic Workshop, Book 4, pages 3 and 4

Page 25

Aim: To provide practice in column addition with carrying

Suggestions: Some of the examples in ex. 1–4 may be done mentally by the more advanced members of the class, but pupils who prefer to write the examples should be permitted to do so. If anyone cannot understand the carrying principle, ask a pupil to demonstrate it for him by using sticks in a fashion similar to that described in the Guide for the previous page. Some of the more advanced pupils will be able to do ex. 5–7 orally and should be permitted to demonstrate their skill before the class. Ex. 9–10 reteach the dollar and cent relationship. Some pupils may find a box of play coins helpful in seeing through this process.

Key: **1.** 114, 73, 42, 89, 656, 643, 947. **2.** 110, 53, 78, 100, 567, 891, 845. **3.** 126, 52, 84, 45, 626, 849, 992. **4.** 73, 97, 78, 122, 955, 617, 834. **5.** 89, 93. **6.** 117, 106. **7.** 118, 145. **8.** 30 min. + 35 min. + 45 min. = 110 min.; more. **9.** 35¢ + 27¢ + 84¢ = 146¢; $1.46. **10.** $1.17.

Pages 26–27

Aim: To present word problems dealing with the school library

Suggestions: Most children of this age are regular users of a school or public library. Every effort has been made to create problem situations which occur frequently in the everyday life of the child and to keep the prices in line with current costs. In ex. 4 on page 26, notice the range in the cost of books, a range that is in keeping with present prices of library books. On page 27, ex. 8 and 9 involve the decimal point used in dollars and cents. Remind the pupils that a decimal is used to *separate the dollars from the cents.*

Key: Page 26 **1.** 30 books + 18 books + 26 books + 52 books = 126 books. **2.** 6 hours; 4 hours 15 minutes. **3.** 22 + 10 + 19 = 51 (people). **4.** $2.50 + $3.75 + $1.95 = $8.20; $10.00 − $8.20 = $1.80.

Page 27 **5.** $1.75 + $2.35 = $4.10. **6.** $1.85 + $2.50 = $4.35. **7.** $5.76 + $6.63 + $5.45 = $17.84; $7.93 + $.58 + $4.28 = $12.79. **8.** 142, 739, 1459, $14.07, $20.35, $1.67. **9.** 138, 1641, 1688, $20.33, $13.10, $1.95.

Page 28

Aim: To reteach subtraction of larger numbers without regrouping

Suggestions: This is the simplest type of subtraction example, and the pupils will recall quite readily how to complete the examples. Stress place value and the fact that subtraction starts in the ones place. If they wish to check their answers, remind them that they do so by means of addition. Suggest that the arithmetic word *remainder* be added to their vocabulary chart.

If you prefer to teach additive subtraction, refer to page 327. Do not, however, try to teach both methods of subtraction.

Key: **3.** 25, 63, 52, 7, 143, 63, 163. **4.** 32, 15, 20, 34, 55, 1, 61.

Page 29

Aim: To reteach one-step regrouping in subtraction

Suggestions: Although most of the class will recall how to regroup in subtraction, the first two examples on this page are worked out with helping numbers. It might be advisable to use a tens boy and a ones boy to illustrate this work visually. The tens boy will hold 4 bundles of sticks, and the ones boy will hold 5 single sticks. You approach the ones boy and ask for 8 sticks. Since he cannot give you 8 sticks, he takes a bundle of ten sticks from the tens boy. The ones boy breaks up the bundle of ten sticks into single sticks (as the ones boy can hold only single sticks), and he thus has 15 sticks. At this point you might call attention to the helping number 15 above the 5 in the text illustration. The ones boy hands you 8 sticks and has 7 sticks remaining. Then you ask the tens boy for 2 bundles of sticks. The tens boy gives you 2 bundles and has 1 bundle remaining. Thus 1 bundle of ten plus 7 sticks, or 17 sticks, remains. The class then discusses what happened to that other bundle of 10 sticks. This process illustrates the regrouping concept. In similar fashion, the second example can be acted out before the class. Do not encourage the use of helping numbers, but permit pupils who cannot do the work mentally to use this crutch.

Key: **3.** 38, 18, 24, 15, 358, 607, 557. **4.** 43, 29, 49, 26.

Pages 30–31

Aim: To reteach double regrouping with zeros in the minuend

Suggestions: If the work on the previous page is understood, the extension to double regrouping is easily made. The real difficulty on this page rests with examples having double zeros in the minuend. Notice the manner in which the textbook explains example 2A on page 30. This system helps pupils understand what to do when two zeros appear.

Workbook Reference: Arithmetic Workshop, Book 4, pages 7 and 8

Key: Page 31 **1.** \$5.00 − \$1.95 = \$3.05. **2.** 323 − 185 = 138 (boys). **3.** 210 − 175 = 35 (horses). **4.** 400 − 215 = 185 (boxes). **5.** 392, 184, 236, 487, 172, 244. **6.** 286, 327, 47, 286, 253, 346. **7.** 672, 159, 259, 137, 404, 194. **8.** 30, 439, 765, 179, 597, 460.

Pages 32–34

Aims: To reteach the meaning of multiplication; to review simple multiplication facts

Suggestions: *Multiplication is a short way to add equal groups or numbers.* This fundamental understanding must be continually stressed and carefully developed. Notice that ex. 2 on page 32 expresses the additive concept of multiplication. The use of such terms as four 2's are 8 and six 2's are 12 helps greatly in the development of this basic understanding. Whenever a pupil forgets a multiplication fact, refer him to addition and let him *find the answer by adding*. Suggest that the arithmetic terms *multiply*, *multiplication fact*, and *product* be added to the vocabulary chart. The work on page 32 redevelops the 2's and their reverses in multiplication; page 33 shows the 2's in order and then provides random practice on them in ex. 8 and 9; page 34 develops the 3's and their reverses. At this point, pupils should be encouraged to build their own multiplication chart similar to the one shown below. The facts of 2's and 3's can be placed in the chart in a manner similar to that shown below for the facts 2 × 4 and 2 × 6. As additional facts are relearned or discovered, the table enlarges until all of the boxes are filled. This chart then serves as a ready reference for the pupil during the fourth grade.

	0	1	2	3	4	5	6	7	8	9
0										
1										
2					8		12			
3										
4										
5										
6										
7										
8										
9										

All facts on pages 33 and 34 are presented in vertical form, as that is the way the pupil will most frequently encounter them. Also, all work in multiplication is in an upward direction; thus, in ex. 1 of page 33, the first set of examples reads: "One 2 is 2; two 2's are 4; three 2's are 6"; while the second set reads: "Two 1's are 2; two 2's are 4; two 3's are 6," and so on.

Key: Page 32 **1.** 8 pieces. **4.** Picture B. **5.** 2 × 3 = 6, 5 × 3 = 15, and 6 × 3 = 18. **6.** 14. **7.** 12, 15, 6. **8.** 6, 10, 18. **9.** 18, 16, 12.

Page 33 **2.** 14; 10; 16; 4; 18; 12; 8; 16; 10. **3.** 4 × \$2 = \$8. **4.** 2 × \$8 = \$16. **5.** 2 × 5¢ = 10¢; 9 × 2¢ = 18¢. **6.** 7 × 2 quarts = 14 quarts.

7. 8 × 2 covers = 16 covers. **8.** 16, 8, 6, 2, 18, 12, 10, 4, 6. **9.** 10, 12, 4, 14, 2, 16, 8, 14, 18.

Page 34 **1.** 3, 6, 9, 12, 15, 18, 21, 24, 27, 30; 12; 12; 12. **3.** 24; 12; 9; 18; 27; 15; 21. **4.** 5¢ × 3 = 15¢ paid. **5.** 7¢ × 3 = 21¢; 3 × 6¢ = 18¢. **6.** 4 × \$3 = \$12 paid. **7.** 3 × 7¢ = 21¢ paid. **8.** 3 × \$3 = \$9. **9.** 12, 21, 27, 9, 18, 24, 15, 6, 24.

Page 35

Aim: To acquaint the pupils with the commutative principle for multiplication

Suggestions: An important principle of multiplication, reviewed on this page, should be used constantly in connection with the learning of the multiplication facts. This principle, which was first taught in Grade 3, shows that 6 × 3 has the same answer as 3 × 6; the figures are simply turned around or *reversed.* Similarly, 8 × 2 has the same answer as 2 × 8, but the numbers in 8 × 2 are reversed in 2 × 8. The principle involved is called the *commutative principle.* This principle may be stated as follows: *If two numbers are reversed in order, their product is still the same.* It is evident that this principle affords a great economy of time in learning the multiplication facts. If a pupil has already learned that 2 × 7 = 14, this principle tells him that 7 × 2 = 14. If a pupil forgets the answer to 8 × 2, he should reverse the numbers, which gives 2 × 8, to see if he can then get the answer. If he remembers that 2 × 8 = 16, he knows that 8 × 2 = 16. It should be noted that a corresponding commutative principle was taught on page 8 of the text in connection with the review of the addition facts.

Key: **2.** 3 × 9; 27. **3.** 24. **4.** 18, 18. **5.** 18, 18. **6.** 21, 21. **7.** 27, 27. **8.** 3, 15; 2, 18. **9.** 3, 24; 3, 12. **10.** 2, 12; 3, 21. **12.** 6; 2 × 6, or 12. **13.** 9; 2 × 9, or 18. **14.** 8; 2 × 8, or 16.

Page 36

Aim: To reteach the multiplication facts of 1's and 0's by generalizations

Suggestions: If the additive nature of multiplication is understood, the multiplication facts dealing with the 1's are self-evident. For instance, who would question the statement that one 2 is 2 and one 8 is 8, or that six 1's are 6 and eight 1's are 8. However, if the child is allowed to say one times 2 is 2, one times 8 is 8, six times 1 is 6, eight times 1 is 8, no such obviousness is present. Therefore, the authors suggest that the pupils use the additive language in connection with the 1's. In similar fashion, the zero facts become self-evident. Two 0's are zero; six 0's are zero; one 0 is zero. If pupils are developing their own multiplication chart, the 0 and 1 facts should be placed upon their chart at this time.

Workbook Reference: Arithmetic Workshop, Book 4, page 11

Key: **1.** 1 apple + 1 apple = 2 apples; 2; 2; 2; 2. **2.** 1 cookie + 1 cookie + 1 cookie = 3 cookies in all; 3; 3. **3.** 2, 2; 2. **4.** 3, 3; 3. **5.** 0 apples

+ 0 apples = 0 apples; 0; 0; 0. **6.** 0; 0. **8.** 0; 0; 0; 0. **9.** 5, 0, 0, 8, 0, 9, 6, 0, 4.

Page 37

Aim: To reteach the multiplication of 2-figure and 3-figure numbers by 2 and 3, without carrying

Suggestions: The two illustrative examples on this page stress the place value of all numbers used. Examples involving zeros test the pupils' understanding of place value, and a discussion of these examples will help the slower pupil relearn the multiplication process. Checking of these examples may be done by going over the work again or by adding. For instance, 3 × 32 means that 32 is added three times.

Key: **3.** 96, 88, 60, 39, $6.60, $6.28, $2.08. **4.** 60, 80, 93, 40, $8.20, $9.00, $2.84.

Page 38

Aim: To extend the work on the previous page to include examples involving carrying

Suggestions: The illustrative example shows how addition as well as multiplication is involved in this computation. All of the examples on this page are of a similar pattern. A pupil must know how to multiply; how to carry an unseen number mentally and add it to the product of two other numbers. The use of helping numbers *is not recommended.* Have the children do these examples verbally. When a mistake is made, determine whether the error is one of multiplication or of addition.

Workbook Reference: Arithmetic Workshop, Book 4, pages 9, 10, and 12

Key: **2.** 72, 98, 75, 51, 642, 236, 618. **3.** 52, 114, 192, 36, 818, 921, 292. **4.** 138, 114, 115, 57, 357, 670, 218. **5.** 138, 81, 108, 90, 324, 378, 296. **6.** 190, 154, 198, 184, 454, 945, 416.

Page 39

Aim: To provide a series of mixed examples

Suggestions: This is the first such activity in the fourth-grade book. Urge pupils to watch their instructions carefully. Point out that ex. 3 and 4 are labeled *subtract.* As pupils work on these examples, observe carefully their behavior. Notice those who slow down on any one section. Some teachers will build at this time individual record cards. As weaknesses are revealed, note them on the pupil's card and set up a remedial program to correct the weakness. When the papers are corrected, analyze each error to determine the cause. Does the error show a lack of knowledge of a basic fact or of a basic process?

Key: **1.** 89, 83, 104, 95, 130, 807, 1112. **2.** 154, 130, 208, 106, 192, 1871, 2432. **3.** 279, 4, 586, 89, 610, 586. **4.** 379, 732, 156, 358, 2364, 2018. **5.** 214, 501, 248, 39, 325, 529. **6.** 628, 915, 662, 453, 739, 943. **7.** 369, 681, 654, 363, 630, 927. **8.** 168, 198, 74, 132, 872, 721, 672. **9.** 118, 160, 112, 105, 652, 808, 254.

Page 40

Aims: To extend 1-figure multiplication to dollars and cents; to extend carrying from the tens place

Key: **2.** 4 × \$2.72 = \$10.88. **3.** 3 × \$1.80 = \$5.40. **4.** 456, 768, 843, \$5.10, \$19.26, \$5.28. **5.** 904, 520, 789, \$17.68, \$5.40, \$10.89. **6.** 1086, 840, 322, \$11.55, \$8.40, \$9.20.

Page 41

Aims: To reteach the meaning of division; to review the division facts of 2's

Suggestions: Division is closely associated with multiplication. Hence, all division facts can be discovered by referring to their corresponding multiplication facts. This relationship is stressed again and again in this fourth-grade book. Also, pupils are taught that all division work can be checked by multiplication. Technical vocabulary words dealing with division are introduced on this page, words like: *dividing, divided by, division fact, quotient.* These terms may be added to the vocabulary chart suggested in connection with the work on page 5.

Key: **4.** 10; 5; 5; 5. **5.** 24; 8. **6.** 21, 7. **7.** 8, 4. **8.** 18, 9.

Page 42

Aim: To reteach the division facts of 2's

Suggestions: Ex. 1–3 present these facts in random order and in horizontal form. Then in ex. 4 they are shown in regular order. Pupils can readily see that each dividend is 2 larger than the preceding one. Ex. 9 and 10 provide practice in random order.

Workbook Reference: Arithmetic Workshop, Book 4, page 13

Key: **1.** 8, 4, 2. **2.** 5, 1, 9. **3.** 7, 3, 6. **5.** 10¢ ÷ 2¢ = 5 (sticks). **6.** 16 ÷ 2 = 8 (pairs). **7.** 16 children ÷ 2 = 8 children. **8.** 14 apples ÷ 2 = 7 apples. **9.** 6, 9, 2, 5, 3, 7. **10.** 8, 7, 4, 9, 1, 6.

Page 43

Aim: To reteach the division facts of 3's

Suggestion: The last regular instruction in *American Arithmetic, Grade 3* may have been the division facts of 3's. As these facts are not as obvious as the 2's, a number of pupils may need some real reteaching at this point. Provide ample practice and suggest that flash cards be made for these facts.

Key: **1.** 18, 6. **2.** 27, 9. **3.** 12, 4. **6.** 2, 7, 4, 3, 8, 9. **7.** 3, 6, 9, 1, 6, 5. **8.** 15¢ ÷ 3¢ = 5 (candies). **9.** 18¢ ÷ 3 = 6¢. **10.** 24 ÷ 3 = 8 (days).

Pages 44–45

Aim: To reteach the division of 2-figure and 3-figure numbers by 2 and 3

Suggestions: In *American Arithmetic, Grade 3* the children studied problems related to a trip to a park. Here the pupils have an opportunity to discuss their visits to the zoo. Before they begin working the division examples on these pages, allow them to discuss their experiences. In fact, if your school is located near a city park, you might organize a field trip to the zoo section and correlate arithmetic with reading, spelling, written and oral English, and social studies. The main objective of these pages is to reteach a process step in division. The first important point is to instruct children concerning the *direction of this operation.* All review work dealing with addition, subtraction, and multiplication has required a right-to-left operational direction. That is, the ones place has been treated first, then the tens place, then the hundreds place. In division, however, there is a left-to-right direction. The tens place is treated first and then the ones place. To many pupils this reversal in direction will prove troublesome. Watch carefully how the pupils complete their calculations on page 45 and correct anyone who is still using the right-to-left direction in division calculation.

Workbook Reference: Arithmetic Workshop, Book 4, page 14

Key: Page 44 **2.** 24, 23, 13, 12, 31, 32. **3.** 13, 41, 11, 34, 23, 22.

Page 45 **4.** Multiply quotient by divisor. **5.** 71, 52, 42, 61, 61. **6.** 91, 63, 73, 84, 82. **7.** 83, 91, 73, 62, 93.

Page 46

Aim: To reteach the meaning of ½, ¼, and ⅓

Suggestions: This page refers to ½, ¼, and ⅓ of a single object such as a square or a circle. An auxiliary learning of this page is to discover that 3 thirds are the same as a whole or 2 halves. This work can well be extended to include the understanding that ½ of an object is more than ¼ of the same object; thus the magnitude of the unit fraction is understood. The flannelboard, squared pieces of paper, or pictures of candy bars will help to show what ½, ¼, and ⅓ of an object is.

Key: **4.** 4 fourths. **5.** 2 fourths. **7.** 3 thirds.

Page 47

Aim: To reteach ½ and ⅓ as examples of dividing a thing or a group of things into equal parts

Suggestions: The concept of division as partitioning, or part-taking, is more difficult for some pupils than the measurement concept of division. It is easier for them to comprehend that there are two 6's in 12 than to grasp that ½ of 12 is 6. Children can discover by manipulating objects that ½ of a group of objects is the same as dividing the number of objects by 2; that ⅓ of a group is the same as dividing the group by 3. Your pupils should grasp the concept of division and of fractional parts if you ask such questions as, "What part of 12 is 4?" "What is ¼ of 12?" "What is 12 divided by 4?"

Key: **3.** 6 pennies ÷ 3 = 2 pennies; 2. **4.** 2. **5.** 5; 7; 9; 3; 7; 9; 1. **6.** 9 nuts; 6 nuts. **7.** ½ of 18¢. **8.** ½ of the pie. **9.** ½ of the group.

Page 48

Aim: To reteach linear measure dealing with inches, feet, yards

Suggestions: The fall physical examination for school children is usually completed by this time; therefore, the pupils have measured their height. Also, since rulers have been used many times, the work here is merely review. The relationships which exist between the foot and the yard should be stressed, and everyday classroom experiences will be replete with opportunities to measure objects with a ruler.

Key: **1.** 36 inches. **2.** 12 inches; 48 inches; 54 inches. **4.** inches; foot (feet); yard(s). **5.** 31 inches long; 15 inches wide.

Page 49

Aim: To provide a review of Chapter 1

Key: **1.** 18, 21, 28, 13, 180, 245, 160, 221. **2.** 887, 693, 1325, 1570, 1406, 1403. **3.** 104, 27, 367, 491, 355, 334. **4.** 84 in. **5.** 4 yd. **6.** 45 in. **7.** 693, 308, 964, 1578, 612, 327. **8.** 212, 638, 852, 612, 1113, 486. **9.** 21, 14, 43, 72, 51, 93. **10.** 32, 33, 74, 51, 64, 83.

Pages 50, 52

Aim: To present diagnostic tests with reference to practice pages

Suggestions: The review work on these two pages is broken by a page of word problems so that pupils will not find this important testing program monotonous. As the work on pages 50 and 52 is corrected, urge the class to make self-assignments on the pages indicated as practice pages. The teaching-learning situation is a two-way street. Some pupils feel that they should do only what the teacher demands. Here is an opportunity to encourage pupils to become their own teachers. Such a coming-out-from-within rather than an imposing-from-without activity is a true educational experience. The superior pupil will make excellent self-assignments and will be happy to notice improvements in accuracy. The inferior pupil will take a devil-may-care attitude and wait for the teacher to catch up with him. Here is a real opportunity to build positive attitudes toward learning in general and arithmetic in particular.

Key: Page 50 **1.** 12, 10, 12, 21, 23, 22. **2.** 109, 99, 82, 143, 186, 206. **3.** 669, 469, 366, 778, 599. **4.** 955, 936, 844, 422, 700. **5.** 62, 40, 233, 2, 190. **6.** 14, 45, 166, 436, 316. **7.** 42, 292, 263, 70, 184. **8.** 575, 398, 68, 144, 157.

Page 52 **1.** 2, 12, 16, 8, 14, 18, 10. **2.** 21, 15, 24, 27, 9, 12, 18. **3.** 46, 123, 60, 608, 842. **4.** 84, 78, 92, 621, 210. **5.** \$5.79, \$5.60, \$7.83, \$3.46. **6.** 3, 7, 8, 5, 9. **7.** 1, 6, 8, 5, 9. **8.** 43, 11, 32, 44. **9.** 92, 81, 54, 53. **10.** 63, 81, 62, 92.

Page 51

Aim: To present Problem Test 1

Suggestions: The real purpose of this work is to determine which pupils are able to translate words into figures. Arithmetic *is a symbolic activity*. Intelligence is required to translate words into figures and figures into words. Each problem situation described on this page is within the environment of the pupil. Can the pupil read the problem, determine what is asked for, and make the necessary computations? In order to complete this work in a satisfactory fashion, the pupil must comprehend the addition, subtraction, multiplication, or division thought pattern expressed in the problem.

Workbook Reference: Arithmetic Workshop, Book 4, page 15

Key: **1.** 5 balloons + 6 balloons + 5 ballons = 16 balloons. **2.** 50¢ − 18¢ = 32¢. **3.** 3 × $1.50 = $4.50. **4.** 108 children ÷ 2 = 54 children. **5.** $.65 + $.90 + $2.25 = $3.80. **6.** 88¢ ÷ 2 = 44¢. **7.** 300 stamps − 214 stamps = 86 stamps. **8.** 9 × 12 eggs = 108 eggs. **9.** $4.00 − $2.79 = $1.21. **10.** 107 beads − 99 beads = 8 beads.

Chapter 2

Aims of Chapter 2. The major aims of Chapter 2 are to:

1. Review the addition, subtraction, multiplication, and division skills retaught in Chapter 1.
2. Reteach liquid measure, coin equivalents, making change, and Roman numerals I–XII.
3. Contrast partition and measurement division.
4. Teach the following new understandings and skills:
   - a. multiplication facts of 4's and their reverses
   - b. division facts of 4's
   - c. how to find $\frac{1}{4}$ of a number
   - d. zero division facts by generalization
   - e. uneven division facts with divisors of 2, 3, 4
   - f. division of 2-figure and 3-figure numbers by 2, 3, and 4
   - g. two new multiplication thought patterns
   - h. four new division thought patterns
   - i. how to solve problems without numbers
   - j. technical vocabulary words dealing with the division process

Page 53

Aim: To develop a readiness for learning the multiplication facts of 4's

Suggestions: The taking of pictures usually intrigues a 9- to 10-year-old child. You will find that many pupils in the fourth grade possess their own cameras and picture albums. Thus, the choice of this center of interest is intended to develop thinking concerning new multiplication facts. Notice that multiplication is again linked to addition (see problem 3). The horizontal form of the multiplication fact is introduced in ex. 1 and continues throughout the page. If the pupils in your room constructed their own multiplication tables, as suggested in connection with the work on pages 32–34, the new facts pertaining to 4 may now be placed on the chart.

Key: **1.** 2 × 4 pictures = 8 pictures; 8; 8. **2.** 3 × 4 pictures = 12 pictures; 12 pictures; 12; 12. **3.** 16; 16. **4.** 20; 20; 20. **5.** 24. **6.** 28; 32; 36.

Page 54

Aim: To teach the multiplication facts of 4's

Suggestions: The important part of this learning has already taken place on the previous page. Notice that ex. 1 shows the facts in orderly sequence, and that ex. 9 provides further practice by a random-order arrangement. In ex. 1 the upward nature of multiplication is carefully followed as the facts are read: "one 4 is 4; two 4's are 8," and so on.

Key: **2.** 20; 28; 36; 8; 24; 32. **3.** 12; 4; 20; 16. **4.** 9 × 4¢ = 36¢. **5.** 6 × 4 children = 24 children. **6.** 8 × 4 sandwiches = 32 sandwiches; 32. **7.** 7 × 4 plants = 28 plants. **8.** 2 × $4 = $8. **9.** 24, 36, 4, 16, 32, 8, 28, 12, 20.

Page 55

Aim: To teach the reverses of the multiplication facts of 4's

Suggestions: By now the commutative law in multiplication (and addition) is well established, and pupils will have little difficulty in recalling the reverses. Have these reverses placed in the pupils' individual multiplication tables. Most of the work on this page is planned as an oral activity.

Workbook Reference: Arithmetic Workshop, Book 4, page 16

Key: **2.** 20; 20. **3.** 24; 24; 32; 32; 36; 36. **5.** 28, 2, 4. **6.** 20, 7, 4. **7.** 32, 3, 4. **8.** 4 × 8¢ = 32¢. **9.** 16, 20, 24, 20, 28, 32, 24, 28, 36.

Page 56

Aim: To extend the multiplication of 2-figure and 3-figure numbers to include the multiplication facts of 4's

Suggestions: No new process work is involved here. However, you should be alert to determine which pupils hesitate because of a lack of knowledge of the multiplication facts and which because of addition difficulties. Ex. 3 requires addition by carrying and also presents the zero problem. Encourage pupils to talk out the solutions to these examples, especially those involving carrying.

Workbook Reference: Arithmetic Workshop, Book 4, pages 17, 18, and 19

Key: **1.** 28, 36, 24, 32, 20, 12, 36, 16, 0. **2.** 30, 38, 26, 34, 22, 14, 38, 18, 2; 31, 39, 27, 35, 23, 15, 39, 19, 3. **4.** 48, 244, 496, $3.40, $4.92, $8.76. **5.** 280, 152, 824, $1.72, $20.28, $7.60. **6.** 156, 144, 832, $3.48, $6.84, $12.45.

Page 57

Aim: To reteach liquid measure

Suggestions: In Grade 3 these measures were learned by the experimental method. It is suggested that you have in class a pint and a quart bottle, a one-gallon jug, and a measuring cup. Allow pupils to determine the number of cups in a pint, pints in a quart, and quarts in a gallon, and record the results of their experiments on the board. Some of the multiplication facts of 2's and 4's will be used on this page. Some girls will recall recipes involving cup measures; while others will indicate that in the making of milk from powder, a measuring cup and a quart bottle are used. The class will enjoy concluding the period by estimating the amounts of water in various containers. Such estimates may be made of quantities approximating a quart, a gallon, and a half pint.

Key: **1.** 4 times; 4 quarts. **2.** 2 pints; 8 pints. **3.** 2 cups; 4 cups; 16 cups. **6.** 2. **7.** 6. **8.** 4. **9.** 8. **10.** 8. **11.** 16.

Page 58

Aim: To teach two thought patterns in multiplication

Key: **1.** 2 × 12 eggs = 24 eggs. **2.** 8 × 40 tickets = 320 tickets. **3.** 3 × 75 beads = 225 beads. **4.** 4 × 16 nails = 64 nails. **5.** 4 × \$.75 = \$3.00 **6.** 4 × \$.35 = \$1.40. **7.** 4 × \$.89 = \$3.56.

Page 59

Aim: To contrast a multiplication with an addition thought pattern

Suggestions: Although all of the problems on this page can be completed by addition, there are some which are more easily computed by multiplication. Pupils are challenged to select the easier of the two approaches to the problems.

Key: **1.** 14 tickets + 15 tickets + 18 tickets = 47 tickets. **2.** 3 × 14 tickets = 42 tickets. **3.** Add; 25¢ + 50¢ = 75¢. **4.** Multiply; 3 × \$.45 = \$1.35. **5.** Multiply; 4 × 19¢ = 76¢. **6.** Add; \$1.60 + \$.85 = \$2.45.

Page 60

Aim: To reteach coin equivalents and money value

Suggestions: A discussion of money is an important one. Complete these exercises as a class activity. Some pupils may wish to work with play money to assist them in solving the problems. An additional learning on this page is the matter of *fractional amounts*. Notice the reference in the right column of ex. 4, 5, and 6 to a $\frac{1}{2}$. Also the word *quarter* could be developed in its true interpretation of $\frac{1}{4}$ of a dollar. Some teachers find that writing the word *quarter* as $\frac{1}{4}$ of a dollar both helps pupils make this association and tends to make more meaningful the words *half* and *quarter*.

Key: **1.** 20, 2. **2.** 60, 25. **3.** 90, 5. **4.** 15, 50. **5.** 20, 10. **6.** 50, 5. **7.** 75, 20. **8.** 100, 10. **9.** 4 quarters. **10.** 8 quarters. **11.** 3 dollars; 3 dollars.

Page 61

Aim: To review change making

Suggestions: Explain that when a purchase at a store is made, the clerk always makes change by a process of addition, as explained in ex. 1. If you buy something that costs 37¢ and give the clerk a dollar, the clerk thinks "37¢" and then adds coins, one by one, to 37¢ until he reaches a dollar. The clerk does not subtract 37¢ from \$1.00, which gives 63¢, and then hand you 63¢. In presenting change making to a class, start with many oral exercises in which actual money or toy coins are used. It is important to state that change making is a process of *successive additions* by which coins are added, one by one, to the amount of the purchase until the amount given the clerk is reached. This successive addition is done *mentally*.

The method used in making change is also the method used in checking the change that the clerk gives you after making the purchase. If you have bought something that costs 8¢ and have given the clerk a quarter, he will hand you 2 pennies, a dime, and a nickel. You will check this change by adding the 2 pennies to the 8¢, which gives 10¢; next add the dime, which gives 20¢; and then add the nickel, which gives 25¢. Since 25¢ is the amount you gave the clerk, the change is right. The process of checking change may be summarized as follows: *Start with the cost of your purchase and add to it the coins the clerk gives you. The sum should equal the amount you gave the clerk.*

In making change it is customary to use the smallest number of coins that will give the required amount of change. For example, in making change for a purchase of 15¢ out of a half dollar, the change should be 1 dime and 1 quarter. It would be correct, of course, if the change were 1 nickel and 3 dimes, or 2 nickels and 1 quarter; but the fewer coins used, the better the process.

Workbook Reference: Arithmetic Workshop, Book 4, page 23

Key: **3.** 39, 40, 50, 75, $1.00. **4.** 2 pennies and 2 dimes; 28 (or 28, 29), 30, 40, 50. **5.** 63 (or 63, 64), 65, 75, $1.00. **6.** 1 penny, 1 nickel, 1 dime; 1 penny, 3 nickels. **7.** 32 (or 32, 33, 34), 35, 40, 50, $1.00; 70, 75, $1.00; 15, 25, 50, $1.00; 8, 10, 15, 25, 50, $1.00; 59, 60, 65, 75, $1.00; 27, 30, 40, 50, $1.00; 46, 50, $1.00.

Page 62

Aim: To challenge pupils to meet abstract problem-solving situations

Suggestions: All the word problems which have been included so far in the *American Arithmetic* series have been taken from real-life situations. The problems on this page are unreal in that no actual facts are given. A situation is described without numbers, and the pupil is asked how he would solve the problem if it did contain numbers. This "if" may prove quite troublesome to pupils who do not possess a high degree of abstract intelligence. Allow the better pupils to carry the brunt of this type of class activity. After each problem has been solved without the use of numbers, then encourage the other pupils to suggest numbers that would provide a real answer. For instance, in the first problem, it might be proposed that Patty had 10¢ and found 5¢. You should accept whatever numbers are proposed — provided they are realistic in nature — and permit the class to solve the problem, using those facts. Avoid suggesting facts, thus encouraging the pupils to make this contribution.

Key: **1.** Add. **2.** Subtract. **3.** Multiply. **4.** Add. **5.** Divide. **6.** Subtract. **7.** Multiply.

Page 63

Aim: To provide a review of addition skills

Suggestions: See the instructions in the Guide for the work on page 7 or turn to page 328 of the text. Remind the pupils not to write in their books.

Workbook Reference: Arithmetic Workshop, Book 4, page 21

Key: **1.** 1446, 960, 956, 1718, 826, 1324. **2.** 1253, 1000, 1695, 1106, 1422, 717. **3.** 4578, 4489, 8768, 5923, 6348. **4.** $27.75. **5.** 2965 pounds. **6.** $21.86; 1253. **7.** $27.31; 1264. **8.** 4588; 1253. **9.** 6985, 8899, 7719, 8892, 8729.

Page 64

Aim: To review problem solving

Key: **1.** Subtract; 50 dolls − 28 dolls = 22 dolls. **2.** Divide; \$15 ÷ 3 = \$5. **3.** Add; 6 crayons + 9 crayons + 4 crayons + 5 crayons = 24 crayons. **4.** Multiply; 3 × 12 crayons = 36 crayons. **5.** Subtract; \$1.00 − \$.45 = \$.55. **6.** Divide; 48 cookies ÷ 2 = 24 cookies. **7.** Multiply; 4 × \$.15 = \$.60. **8.** Subtract; 15¢ − 8¢ = 7¢. **9.** Add; 174 stamps + 75 stamps = 249 stamps.

Page 65

Aim: To teach the use of parentheses

Suggestions: It is important for each pupil to understand that in examples involving both addition and multiplication there must be a way of indicating which process is to be completed *first.* The parentheses give us such an indication. In exercises involving only addition, the associative principle makes it unnecessary to perform the steps in a particular sequence (Cf. ex. 6). Stress the necessity for careful attention to signs in ex. 3–5.

Key: **3.** 35, 27, 32. **4.** 23, 17, 18. **5.** 28, 33, 24. **6.** 12; no. **7.** $(2 \times 4) + 3 = 11$; $(7 \times 4) + 3 = 31$; $(4 \times 4) + 3 = 19$; $(8 \times 4) + 3 = 35$; $(0 \times 4) + 3 = 3$; $(6 \times 4) + 3 = 27$; $(9 \times 4) + 3 = 39$; $(3 \times 4) + 3 = 15$; $(5 \times 4) + 3 = 23$; $(1 \times 4) + 3 = 7$.

Pages 66–67

Aim: To review the even division facts for the 4's

Suggestions: The division facts given in ex. 1 were taught in Grade 3 as supplementary work. If individual pupils have trouble with certain of these facts, they should make a special study of the facts in question. Attention is called to ex. 4 on page 66, which shows the relationship between 32 ÷ 4 and 8 × 4. The pupil already knows that eight 4's make 32, and it is this fact that tells him that 32 ÷ 4 = 8. If a pupil knows thoroughly the multiplication facts for the 4's, he should have no trouble with the division facts for the 4's. If you find that certain pupils do not know the 4's division facts, first check these pupils with respect to their mastery of the 4's multiplication facts. If they don't know the 4's multiplication facts, they are certain to have trouble with the 4's division facts. Page 67 extends the practice on these facts and in ex. 7 shows them in orderly sequence.

Workbook Reference: Arithmetic Workshop, Book 4, page 24

Key: Page 66 **1.** 20 dots; 4, 8, 12, 16, 20; 5 groups; 5. **2.** 4 groups; 4. **3.** 7. **4.** Yes; 8. **5.** 2. **6.** 9, 9. **7.** 6, 6. **8.** 4, 4. **9.** 24 ÷ 4 = 6 (tables). **10.** 32 ÷ 4 = 8 (gal.).

Page 67 **1.** 2, 3, 6. **2.** 5, 9, 8. **3.** 7, 4, 5. **4.** 3, 8, 1, 4. **5.** 9, 5, 2, 7. **6.** 4, 7, 9, 6. **9.** 8, 5, 3, 2, 9, 4, 1. **10.** 20¢ ÷ 4¢ = 5 (oranges); 8; 6; 4. **11.** 24 ÷ 4 = 6 (breakfasts); 2 × 12 eggs = 24 eggs.

Page 68

Aim: To teach how to find $\frac{1}{4}$ of a number

Suggestions: Ex. 1 shows the meaning of $\frac{1}{4}$ of a single object while ex. 2 shows the meaning of $\frac{1}{4}$ of a group of objects. Every fraction can represent a part of a single object or a part of a group of objects. To find $\frac{1}{4}$ of a group of objects is the same as to find $\frac{1}{4}$ of a number, which is done by dividing the number by 4. To give meaning to this work, start with 16 or 20 objects and divide them into 4 equal groups. Also fold a piece of paper into quarters, or draw a line on the board and divide it into quarters. Emphasize the fact that the 4 quarters of anything are all the same size. If a pie is cut into quarters, all 4 pieces are the same size.

Key: **2.** 3 lollipops; 3; 3; yes. **3.** 5 pennies; 5; 5. **4.** \$4 ÷ 4 = \$1; \$3; \$5. **5.** 20 ÷ 4 = 5 (marbles); 7 (marbles).

Pages 69–70

Aim: To review the zero facts in division and their use in exact division when zero appears in the dividend

Suggestions: The zero facts in division are confined to those facts which have 0 as a dividend, such as $4\overline{)0}$ and $6\overline{)0}$. There are no zero facts having 0 as a divisor since such facts would be meaningless. There are nine zero facts in all, beginning with $1\overline{)0}$ and ending with $9\overline{)0}$. These zero facts are best remembered by presenting them all in the form of a generalization; namely, "0 ÷ any number = 0." The nine zero facts are seldom used by themselves; but they become very useful when used in exercises involving other facts as well, such as those illustrated in ex. 5–7 on page 69.

Most of the examples on page 70 have either a final zero or a zero in the tens place in the quotient. Reference to *place value* will assist pupils in securing proper understandings of this computation. Remember that in this type of work, *zero is a place holder*, without which correct answers could not be secured. Urge the pupils to discuss what they do in solving examples in ex. 1–5 on page 70 so that the full implication of the place value nature of every zero is understood.

Workbook Reference: Arithmetic Workshop, Book 4, page 26

Key: Page 69 **1.** 2 pencils; 2. **2.** No pennies; 0. **4.** 0; 0; 0; 0. **6.** 60 eggs ÷ 3 = 20 eggs. **7.** 40¢ ÷ 4 = 10¢.

Page 70 **1.** 30, 101, 220, 52, 61. **2.** 71, 32, 211, 90, 50. **3.** 122, 42, 91, 81, 70. **4.** 52, 73, 31, 83, 70. **5.** 120, 201, 320, 82, 90. **6.** 400 tickets ÷ 4 = 100 tickets. **7.** 120 marbles ÷ 2 = 60 marbles. **8.** 126 children ÷ 3 = 42 children. **9.** 10, 40, 82, 102, 424, 124; 5, 20, 41, 51, 212, 62. **10.** 20, 44, 144, 240, 100, 220; 10, 22, 72, 120, 50, 110. **11.** 42, 14, 64, 122, 222, 420; 21, 7, 32, 61, 111, 210.

Page 71

Aim: To provide further practice in subtraction and multiplication

Workbook Reference: Arithmetic Workshop, Book 4, page 22

Key: **1.** 295 children. **2.** 116 papers. **3.** \$3.02. **4.** 181, 336, 188, 625, 1403, 1245. **5.** 80, 74, 216, 735, 630, 966. **6.** 675 tickets. **7.** \$3.00. **8.** 1288, 864, 516, \$4.20, \$6.98, \$8.76. **9.** 726, 924, 2416, \$2.56, \$12.72, \$6.50. **10.** 1628, 768, 420, \$5.48, \$14.98, \$16.08.

Pages 72–74

Aim: To teach the uneven division facts with divisors of 2, 3, and 4

Suggestions: The new topics of Grade 4 begin at this point with the teaching of the uneven division facts. Most of the preceding work has been a review and an extension of the work of Grade 3. Division facts like $3\overline{)6}$ and $4\overline{)12}$ are called *even division facts* since the division is exact, without a remainder. Facts like $3\overline{)7}$ and $4\overline{)14}$ are called *uneven division facts* because the division is not exact and leaves a remainder. In both the even and the uneven division facts, the quotient is always a number of one figure. An example like $2\overline{)23}$ is *not* an uneven division fact because the quotient is a 2-figure number.

You should first carefully illustrate some uneven division facts by the use of objects, as is done in ex. 2–4 on page 72. Then show how to find the answer *without* using objects, as is done in ex. 3 on page 73. From the beginning it is important to acquaint the pupil with the words *dividend, divisor, quotient,* and *remainder* and to use them hereafter. In ex. 5 on page 73, you see that each of the examples is written out in the long form, similar to the steps used in long division. The same is true in ex. 1 on page 74. This represents the approved practice today for working the uneven division facts in Grade 4. On the other hand, an even division fact like $3\overline{)6}$ is not worked out in the long form; in this case the work is done mentally and the answer written at once as shown at the right. Twenty years ago the work of finding the answer to an uneven division fact was always done mentally and the answer written at once as shown on the right, but experience has shown that to do all the work mentally at this stage is too great a strain on the pupils. Later on, however, the better pupils are encouraged to get the answers to uneven division facts mentally, particularly in Grades 5 and 6.

$$\begin{array}{r}2\\3\overline{)6}\end{array}$$

$$\begin{array}{l}\;\;2\text{ R1}\\3\overline{)7\;\;\;\;}\end{array}$$

Workbook Reference: Arithmetic Workshop, Book 4, page 27

Key: Page 72 **1.** 16 ÷ 4 = 4 (groups). **2.** 5 equal groups. **3.** 5 equal groups; no; 6 equal groups; yes, two. **4.** Yes — second set, 2 dots; third set, 2 dots.
Page 73 **4.** 19¢ ÷ 3¢ = 6 R1; 6 cookies, 6, 1¢ left.
Page 74 **2.** 1 R3, 7 R1, 9 R1, 6 R3, 8 R1, 9 R1. **3.** 2 R2, 2 R3, 5 R1, 4 R2, 7 R3, 5 R1. **4.** 1 R1, 3 R1, 5 R3, 8 R2, 8 R1, 9 R1. **5.** 4 R1, 7 R1, 8 R1, 3 R1, 9 R2, 6 R2. **6.** 3, 1. **7.** 2, 1. **8.** 2, 1. **9.** 4, 1. **10.** 30 ÷ 4 = 7 (flowers), 2 pieces left over.

Page 75

Aim: To teach two important problem patterns in division

Two Concepts of Division. There are two concepts of division which are applied in problem solving. These concepts are the *partition* concept and the *measuring* concept. The *partition* concept is illustrated by the following problem: If 3 apples cost 15¢, what does 1 apple cost? To work this problem, you divide thus: 15¢ ÷ 3 = 5¢. In this case you see that the dividend, 15¢, is a *concrete* number while the divisor, 3, is an *abstract* number. The quotient, 5¢, is a *concrete* number. You see that the term *partition* means that the dividend, 15¢, is divided into 3 equal parts.

The *measuring* concept of division is illustrated by this problem: John has 15¢. If apples cost 5¢ each, how many apples can he buy? To work this problem, you divide thus: 15¢ ÷ 5¢ = 3. In this case both the dividend, 15¢, and the divisor, 5¢, are *concrete* numbers while the quotient is *abstract*. You see that the *measuring* concept means that the dividend, 15¢, is *measured* by seeing how many times it contains the unit of measure, which is 5¢. The difference in the two concepts of division lies in the fact that in the partition concept, the divisor is an *abstract* number while in the measuring concept, the divisor is a *concrete* number. Both these concepts of division are met in solving problems where division is required to find the answer.

Problem Patterns in Division. On page 75 two problem patterns in division are stated. Ex. 1–3 on this page illustrate the first pattern and the partition concept, which is stated in the box at the top of the page. Ex. 4–6 illustrate the second pattern and the measuring concept, which is stated in the box above ex. 4.

Key: **1.** 36 ÷ 3 = 12 (cupcakes). **2.** 10 ÷ 2 = 5 (pictures). **3.** 40 ÷ 4 = 10 (children). **4.** 20¢ ÷ 4¢ = 5 (pencils). **5.** 12¢ ÷ 2¢ = 6 (lollipops). **6.** 25¢ ÷ 3¢ = 8 (candies), 1¢ left.

Pages 76–78

Aim: To teach division with carrying and 2-figure quotients

Suggestions: The work on page 76 is the first work on division with carrying. In ex. 1 it will be seen that the work is done in the long form corresponding to the steps in long division. It is important to point out to the pupils that the finding of each quotient figure involves 5 steps — *divide, multiply, subtract, compare,* and *bring down.* Sometimes there is a tendency to omit or slight the fourth step, which is *to compare* the remainder with the divisor; and such a tendency should be discouraged. This comparison step is a very important one because it tells the pupil whether he has the right quotient figure. If the remainder is larger than, or equal to, the divisor, the quotient figure is wrong and should be corrected.

On page 78 division with a 2-figure quotient and a remainder is introduced. The explanation of this work as given in ex. 1 should be carefully studied. The method of checking division with a remainder also requires careful explanation. In presenting new work such as that on this page, the model example should be put on the board so that you can point to each step as you explain it. In ex. 2–3 on page 78 it is important that the pupil check his work for each exercise.

Workbook Reference: Arithmetic Workshop, Book 4, pages 28 and 29

Key: Page 77 **3.** 19, 18, 15, 46, 29, 18. **4.** 28, 27, 13, 17, 15, 19. **5.** 47, 16, 37, 24, 39, 16. **6.** 14, 38, 18, 25, 29, 17. **7.** 32 eggs ÷ 2 = 16 eggs. **8.** 90¢ ÷ 2 = 45¢. **9.** 50¢ ÷ 2 = 25¢; 96¢ ÷ 2 = 48¢.

Page 78 **2.** 37 R3, 34 R2, 45 R1, 59 R1, 59 R3. **3.** 56 R2, 43 R1, 98 R1, 26 R3, 86 R2.

Page 79

Aim: To review column addition

Suggestion: Use the folded-paper method as described on page 327 of the textbook.

Key: **1.** Jim's guess. **2.** Betty's guess. **3.** 99, 153, 113, 120, 145, 240, 152. **4.** 303, 228, 257, 200, 261, 256, 264. **5.** 6837, 3767, 3679, 7189, 8808. **6.** 8996, 6898, 3988, 2899, 6869. **7.** 111; 190; 581.

Pages 80–81

Aim: To use Halloween experiences to review problem solving

Suggestion: Children enjoy Halloween as a fun-making holiday. Thoughts of parties and costumes loom large in the late days of October. If the class is planning a Halloween party, some of the problems on these pages can be omitted and real problems substituted. Notice in ex. 9 on page 81 that the inevitable question of cost arises.

Key: Page 80 **1.** 3 weeks. **2.** 9 × 4 cats = 36 cats. **3.** 8 × 2 hats = 16 hats. **4.** 8 pumpkins + 15 pumpkins = 23 pumpkins.

Page 81 **5.** 43 − 38 = 5 (teachers). **6.** 3 × 12 = 36; they need 4 doz.; 1 package. **7.** 120 sandwiches ÷ 2 = 60 sandwiches. **8.** 6 × 12 cupcakes = 72 cupcakes; 72 cakes ÷ 2 = 36 cakes. **9.** $.90, $3.57, $1.62, $2.03, $5.08, $4.66.

Page 82

Aim: To present two new problem patterns in division

Suggestions: Ex. 1–3 on this page illustrate the first of these problem patterns, which are stated in the box at the bottom of the page. Problems 4–6 illustrate the second problem pattern. It is seen that both these problem patterns illustrate the partition concept of division, which was explained in connection with the suggestions for teaching page 75.

Key: **1.** 110 children ÷ 2 = 55 children. **2.** 24 chairs ÷ 4 = 6 chairs; 8 chairs; 12 chairs. **3.** 75 cookies ÷ 4 = 18 cookies, 3 cookies left over. **4.** 130 buttons ÷ 2 = 65 buttons. **5.** 300 tickets ÷ 4 = 75 tickets. **6.** 90¢ ÷ 2 = 45¢.

Page 83

Aims: To reteach Roman numerals I–XII; to review some vocabulary words by means of a completion test

Suggestions: The work on this page may be done orally. Ex. 6–11 provide an opportunity for you to check the arithmetic vocabulary.

Key: **1.** Roman numerals. **4.** four, ten, six, nine, seven, eleven. **5.** II, V, VI, III, VIII, XII. **6.** divide. **7.** multiplication. **8.** quarts. **9.** change. **10.** quarter, dimes, nickel. **11.** multiply.

Page 84

Aim: To review the division work taught in Chapter 2

Suggestions: The work on this page reviews most of the new material presented in this chapter. It might be well to have a quick review of the uneven division facts of 2, 3, and 4 before the pupils start this work. There will be many final remainders in this work, and the five steps of division should be continually repeated as the pupils do these examples. If the process of division is thoroughly understood and the pupils consider this process a simple one, little trouble will be encountered when more difficult examples appear in later pages.

Key: **1.** 79, 96, 65 R1, 94, 83. **2.** 38, 47 R3, 58, 97 R1, 76 R2. **3.** 96, 75 R1, 54 R2, 45, 39. **4.** $29. **5.** 95 tickets. **6.** 36 sheets. **7.** 19, 44 R3, 59 R3, 43 R3, 64, 49 R2; 25 R1, 59 R2, 79 R2, 58 R1, 85 R1, 66. **8.** 13 R2, 62 R2, 29 R2, 34, 47 R2, 63 R1; 18, 83 R1, 39 R1, 45 R1, 63 R1, 84 R1. **9.** 4 R3, 57 R3, 66 R3, 26 R2, 59 R2, 55 R1; 6 R1, 77, 89, 35 R1, 79 R1, 73 R2. **10.** 14 R3, 57 R1, 42 R2, 28 R1, 65, 27 R1; 19 R2, 76 R1, 56 R2, 37 R2, 86 R2, 36 R1. **11.** 17 R2, 49, 33, 56 R1, 29, 36 R3; 23 R1, 65 R1, 44, 75, 38 R2, 49. **12.** 14, 35 R1, 43 R1, 58, 55, 66 R1; 18 R2, 47, 57 R2, 77 R1, 73 R1, 88 R1. **13.** 94; 87. **14.** 1. **15.** 3.

Page 85

Aim: To test division understandings by means of a Yes-No test

Suggestion: A similar type of test was used in *American Arithmetic, Grade 3;* the testing procedure is well understood by most pupils. The material in the test is not difficult.

Key: **1.** Yes. **2.** Yes. **3.** No. **4.** No. **5.** Yes. **6.** No. **7.** Yes. **8.** No. **9.** No. **10.** Yes. **11.** No. **12.** Yes. **13.** Yes. **14.** Yes. **15.** Yes. **16.** No. **17.** No. **18.** Yes.

Page 86

Aim: To review some of the major aims of Chapter 2

Suggestion: The items on this test review the following aims listed in the Guide at the beginning of Chapter 2:

Chapter Review	*Aim Number*
Ex. 1	4a
Ex. 3	4b and 4c
Ex. 2, 4–6	2
Ex. 7–12	1
Ex. 13	4a
Ex. 14	4b and 4f

Five other aims are reviewed on pages 87 and 88.

Key: **1.** 4, 8, 12, 16, 20, 24, 28, 32, 36, 40. **2.** 3 gallons. **3.** 12¢. **4.** Five. **5.** 91¢. **6.** 80, 90, $1.00; 35, 40, 50, $1.00; 61, 65, 75, $1.00; 25, 50, $1.00; 46, 50, $1.00; 77, 80, 90, $1.00. **7.** Twelve hours; seven hours. **8.** Thirteen minutes; thirty-five minutes. **9.** Eight cookies; yes, 1¢. **10.** $10.90. **11.** 105; 854. **12.** 9999. **13.** 864, 1160, 1120, $6.04, $7.28. **14.** 22, 98, 27, 56, 74 R3.

Page 87

Aim: To present Problem Test 2, which will cover some of the multiplication and division thought patterns taught in this chapter

Suggestion: Aims 4g, 4h, and 4j are tested on this page.

Key: **1.** $35. **2.** 80¢. **3.** 8¢; 72, 75, 80. **4.** $3.56. **5.** $3.93. **6.** 13 gallons. **7.** $3.99. **8.** 64 sheets. **9.** 3 lollipops; yes; 3¢. **10.** 27.

Page 88

Aim: To present a diagnostic test and suggested practice pages

Suggestion: Aims 4d and 4e are tested and reviewed on this page. Pupils should be encouraged to assign practice pages to themselves in whatever section of this diagnostic test they rate poorly.

Key: **1.** 1334, 970, 1243, 1000, 920. **2.** 5582, 1364, 4150, 1. **3.** 920, 848, 838, 694. **4.** 384, 148, 720, $6.08, $12.96. **5.** 832, 1205, 836, $9.80, $6.84. **6.** 21, 20, 81, 80, 102. **7.** 6 R1, 9 R1, 7 R2, 2 R3, 5 R2. **8.** 24, 39, 14, 28, 17. **9.** 68, 63, 84, 75, 57.

Chapter 3

Aims of Chapter 3. The major aims of Chapter 3 are to:

1. Review the skills in addition, subtraction, multiplication, and division taught in Chapters 1 and 2.
2. Teach the multiplication facts of 5's and their reverses.
3. Teach the even and the uneven division facts of 5.
4. Teach how to find $\frac{1}{5}$ of a number.
5. Present a new problem pattern in subtraction and division.
6. Teach the reading of a thermometer.
7. Extend the law of reverses to include multiplication of large numbers.
8. Teach the division of dollars and cents by 2, 3, 4, and 5 where there are remainders.
9. Increase technical vocabulary to include the word *fraction* and to explain the meaning of other than unit fractions.

Page 89

Aim: To develop a readiness for learning the multiplication facts of 5's

Suggestions: These multiplication facts are very easy to learn, and most pupils will by now be familiar with them. They have already had many experiences in buying things that cost a nickel. Notice that the final question in ex. 1 and 2 is additive in nature; thus once again the additive nature of multiplication is stressed. Many pupils will quickly notice that the answers to the multiplication facts of 5's end either in 5 or 0. If there is a number chart in the room, use it in order to clarify this generalization for all the pupils.

Key: **1.** 15¢; 15¢; 15. **2.** 20¢; 20¢; 20. **5.** Six 5's are 30, so seven 5's are 5 more than 30, or 35; seven 5's are 35, so eight 5's are 5 more than 35, or 40; eight 5's are 40, so nine 5's are 5 more than 40, or 45. **6.** 5, 10, 15, 20, 25, 30, 35, 40, 45, 50.

Page 90

Aim: To teach the multiplication facts of 5's

Suggestion: Ex. 1–5 present these facts in random order. Ex. 6 arranges them in orderly sequence, and ex. 7–13 again use random order. If the pupils have built the suggested individual multiplication chart, they should enter the facts of 5's at this time.

Key: **1.** 20, 20, 25; 25. **2.** 25, 25, 30; 30. **3.** 30, 30, 35; 35. **4.** 35, 35, 40; 40. **5.** 40, 40, 45; 45. **7.** 45; 30; 40; 15; 25; 35. **8.** 20; 10; 35; 5. **9.** 30¢; 45¢; 20¢; 40¢. **10.** 45 pennies. **11.** 35, 15, 0. **12.** 5, 30, 45. **13.** 40, 25, 20.

Page 91

Aim: To teach the reverses of the 5's

Suggestion: By this time the law of reverses is well known. The pupils will encounter little difficulty in discovering the answers to these facts and posting them in their individual multiplication charts.

Workbook Reference: Arithmetic Workshop, Book 4, page 34

Key: **1.** 20; 20; yes. **2.** 30; 30. **3.** 35; 35. **4.** 40; 40; 45; 45; 0; 0. **6.** 15, 45, 30, 40, 35, 15, 20, 0, 10. **7.** 35, 10, 20, 45, 5, 25, 40, 45, 30. **8.** 5 × 8 hooks = 40 hooks. **9.** 7, 2, 5. **10.** 5, 9, 4. **11.** 5, 5, 3.

Pages 92–93

Aim: To teach multiplication of a 3-figure number by a 1-figure number in which there is double carrying

Suggestions: This is an extension of the work in carrying originally taught on page 38 and since practiced on many pages. Be sure that the pupils understand the meaning of this work and insist that they do some of the examples verbally so that you can determine whether errors are caused by lack of mastery of the basic multiplication facts or by failure to add correctly.

Workbook Reference: Arithmetic Workshop, Book 4, page 35

Key: Page 92 **2.** 2 × \$5.75 = \$11.50. **3.** 2 × \$1.79 = \$3.58. **4.** 2 × \$2.56 = \$5.12. **5.** 350, 792, 990, 376, 801, 1062. **6.** 408, 744, 500, 944, 732, 916.

Page 93 **1.** 640, 965, 1185, 2340, \$4.75, \$12.80. **2.** 1152, 870, 1316, 1910, \$2.35, \$10.56. **3.** 1295, 3730, 978, 1770, \$4.60, \$6.80. **4.** 1950, 985, 2016, 3440, \$3.85, \$17.90. **5.** \$13.75. **6.** 250 min.; about 4 hr. **7.** \$4.40. **8.** 675, 1130, 2070, 2660, 1320, 895; 405, 678, 1242, 1596, 792, 537; 540, 904, 1656, 2128, 1056, 716; 270, 452, 828, 1064, 528, 358. **9.** 1535, 1455, 740, 1400, 2115, 1365; 921, 873, 444, 840, 1269, 819; 1228, 1164, 592, 1120, 1692, 1092; 614, 582, 296, 560, 846, 546. **10.** 2990, 3395, 2250, 880, 760, 1725; 1794, 2037, 1350, 528, 456, 1035; 2392, 2716, 1800, 704, 608, 1380; 1196, 1358, 900, 352, 304, 690. **11.** 835, 1845, 1970, 930, 1205, 890; 501, 1107, 1182, 558, 723, 534; 668, 1476, 1576, 744, 964, 712; 334, 738, 788, 372, 482, 356.

Page 94

Aim: To review addition and subtraction skills

Suggestion: Use the folded-paper method as explained on page 327 of the textbook.

Workbook Reference: Arithmetic Workshop, Book 4, page 40

Key: **1.** 22, 26, 23, 20, 99, 94, 188, 116. **2.** 11, 17, 18, 17, 99, 198, 234, 182. **3.** 9896, 5978, 6830, 7703, 5928. **4.** 6919. **5.** 300. **6.** \$2.11; \$6.97. **7.** 490, 431, 77, 3221, 1311, 507. **8.** 48, 247, 149, 203, 461, 835. **9.** 654, 387, 387, 1530, 998, 3324.

Page 95

Aim: To present word problems without using pencil or paper

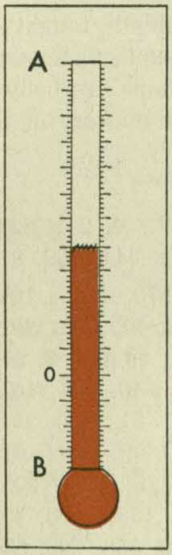
Suggestion: The problems on this page involve either time or money. The first two problems deal with Christmas, a season not far away.

Key: **1.** 10 cards; 20 cards; 35 cards. **2.** 40¢ for 2; 60¢ for 3; 80¢ for 4. **3.** 20, 25, 50; 20, 30, 40, 50; yes. **4.** Nickel, dime, quarter; 2 nickels, 3 dimes. **5.** 6¢. **6.** 5 oranges. **7.** 35¢. **8.** 105 minutes or 1 hour, 45 minutes. **9.** 18¢.

Pages 96–97

Aim: To provide experience in reading a room thermometer

Suggestions: Many fourth-grade classes will already have acquired proficiency at this work because of the active part taken by the class in room management. However, if your class has not experienced this activity, the problems on these two pages are very helpful. Ex. 12 on page 97 might be changed to the following: "Let us build a thermometer for use in the classroom. It will not give the temperature, but we can set it at any temperature we wish." The thermometer is constructed from a piece of heavy cardboard, 3 inches × 10 inches, and two pieces of ½ inch ribbon (red and white). About 1 inch down from the top of the cardboard and 1 inch up from the bottom, cut a slit wide enough to let the ribbon pass through. (See points A and B on the chart.) Between points A and B graduate off the distance in a manner similar to that shown by the chart. Below the bottom slit, make a circle to represent a mercury bowl. Sew the two ribbons together, end to end, and pass the strip through the slits so that between points A and B the ribbon is in front of the cardboard. Turn the cardboard over and sew the ribbon together to make a complete loop. Now the junction of the white and red ribbons shows where the mercury is in the thermometer. The class will be able to set the thermometer at any reading. Notice that below-zero readings are included in this thermometer. Subdivide each 10-point space on the thermometer into five parts, to represent 2-degree variations; but do not number these subdivisions.



Workbook Reference: Arithmetic Workshop, Book 4, page 37

Key: **7.** 96° is not comfortable; 28°. **8.** 61°. **10.** 78°, 83°, 25°, 14° below zero.

Page 98

Aim: To develop a readiness for learning the division facts of 5's

Suggestion: Notice how this work is correlated with the multiplication facts of 5's.

Key: **1.** 30¢ ÷ 5¢ = 6 (nickels). **2.** 6 piles, 6 nickels. **3.** 6; 6; 6. **4.** 4 groups; 4. **5.** 7; 7. **6.** 8; 8; 8. **7.** 9; 9. **8.** 4; 4. **9.** 7; 7. **10.** 5; 5. **11.** 15¢ ÷ 5¢ = 3 (apples). **12.** 45¢ ÷ 5¢ = 9 (nickels).

Page 99

Aim: To teach the division facts of 5's

Suggestion: The facts are arranged in order in ex. 1, but beginning with ex. 7 they are mixed in with uneven division facts of 2, 3, and 4. This is excellent practice and develops a good groundwork for the division examples that follow.

Workbook Reference: Arithmetic Workshop, Book 4, page 38

Key: **4.** 5, 7, 6. **5.** 2, 4, 8. **6.** 3, 9, 1. **7.** 1, 9, 4, 8, 8, 2. **8.** 2, 6, 7, 7, 5, 9. **9.** 3, 6, 6, 9, 3, 4. **10.** 1, 5, 8, 6, 5, 4. **11.** 1, 9, 7, 2, 5, 7. **12.** 2, 6, 3, 8, 8, 4. **13.** 4, 5, 9, 7, 3, 9.

Page 100

Aim: To teach how to find $\frac{1}{5}$ of a number

Suggestion: The work on this page should be done orally.

Workbook Reference: Arithmetic Workshop, Book 4, page 39

Key: **2.** 10 apples ÷ 5 = 2 apples; 2. **3.** 15 crosses ÷ 5 = 3 crosses; 3; 3. **4.** 30 ÷ 5 = 6; 9; 4; 7; 5. **5.** 1¢, 5¢, 8¢, 6¢. **6.** 3¢, 7¢, 2¢, 4¢. **7.** 1¢, 9¢, 9¢, 7¢. **8.** 4¢, 5¢, 8¢, 8¢. **9.** 1¢, 3¢, 6¢, 3¢.

Page 101

Aim: To develop an understanding that the commutative law applies to large numbers in multiplication

Suggestions: Up to this point, all of the work dealing with reverses has been confined to basic addition and multiplication facts. Now the pupil is encouraged to extend this law to include multiplication of larger numbers. After the initial learning has taken place, further work in multiplication can be placed on the board. Some suitable examples would be:

$$\begin{array}{ccccc} 4 & 3 & 2 & 6 & 5 \\ \underline{23} & \underline{45} & \underline{24} & \underline{31} & \underline{52} \end{array}$$

More advanced pupils may indicate that there is no need for reversing these examples, and that it makes no difference if the 1-figure number is at the top or the bottom. A mastery of place value will enable them to complete the example regardless of the position of the numbers.

Key: **1.** 6 children. **2.** 16 boys. **3.** 140 nuts. **4.** 36 people. **5.** 82 leaves. **6.** 144 sandwiches.

Page 102

Aim: To review orally the even division facts learned to date

Suggestion: This is an easy review page and pupil-teachers will enjoy taking charge of the class for this work, leaving you free to keep account of individual errors and note them on your pupil arithmetic inventory cards.

Key: **1.** 1, 8, 11, 111, 61, 110. **2.** 0, 9, 7, 41, 100, 51. **3.** 1, 10, 4, 80, 20, 30. **4.** 50¢ ÷ 5¢ = 10 cards. **5.** 350 stamps ÷ 5 = 70 stamps. **6.** 90, 71, 101, 21. **7.** 31, 81, 40, 91. **8.** 60, 50, 110, 70. **9.** 1, 9, 6, 7, 8, 9. **10.** 3, 3, 3, 4, 7, 5. **11.** 3, 7, 4, 2, 9, 6. **12.** 1, 6, 6, 8, 8, 4. **13.** 4, 7, 8, 9, 5, 5.

Page 103

Aim: To teach uneven division facts of 5's

Suggestions: The reference to nickels and pennies in the first example will attract immediate pupil interest. There are many uneven facts pertaining to the 5's that are not listed on this page. You will wish to have pupils practice them by special oral drills. Notice ex. 7, which brings in a zero fact with a remainder of 3.

Workbook Reference: Arithmetic Workshop, Book 4, page 42

Key: **2.** 3 nickels; 1 penny left over. **3.** 4 R3¢; 4 nickels; 3 pennies left over. **4.** 9 R1¢, 3 R4¢, 5 R2¢, 7 R3¢, 8 R2¢, 6 R4¢, 4 R1¢, 2 R3¢. **5.** 1 R1, 2 R4, 5 R4, 9 R2, 6 R3, 4 R2. **6.** 1 R4, 9 R3, 2 R2, 7 R2, 8 R3, 6 R1. **8.** 0 R4, 1 R3, 0 R2, 1 R2, 0 R1, 2 R1.

Page 104

Aim: To continue work with uneven facts

Suggestions: Here the pupil is shown how to determine whether he has the right quotient figure. If the quotient is correct, the remainder will always be *smaller* than the divisor. It is very important for the pupil to form the habit of inspecting the remainder to make certain that it is smaller than the divisor. Ex. 5–6 on this page represent additional uneven division facts for the 5's since each has a 1-figure quotient. You have probably observed that there are more uneven division facts for the 5's than there are for the 4's. Likewise the 4's have more uneven division facts than the 3's. As the divisor increases in size, there is a corresponding increase in the number of uneven division facts. Hence the 9's have more uneven division facts than any other divisor.

Workbook Reference: Arithmetic Workshop, Book 4, page 43

Key: **1.** 4 R2¢; 4 candy bars; 2¢ left over. **2.** No. **5.** 3 R2, 8 R4, 7 R4, 5 R1, 3 R3, 8 R1, 6 R2, 0 R3. **6.** 4 R4, 7 R1, 5 R3, 9 R4, 6 R3, 3 R4, 5 R2, 1 R1. **7.** Yes.

Page 105

Aim: To present division with carrying in exercises having 5 as a divisor

Suggestions: All the exercises on this page have 2-figure quotients and should be worked in the long form as shown in ex. 1. Some of the review practice which starts with ex. 8 can be oral in nature for the more advanced pupils.

Key: **1.** 28, 35 R2, 64, 83, 97 R3. **2.** 59, 47, 26 R4, 52 R1, 75. **3.** 96, 85 R4, 37, 39, 62 R2. **4.** 87 R1, 42, 78 R2, 93, 24. **5.** 73, 57, 84 R3, 69, 46 R3. **6.** 44 R4, 79, 56, 38 R1, 25. **7.** 15 pencils. **8.** 622, 190, 63 R1. **9.** 156, 122, 192. **10.** 77, 428, 78. **11.** 144, 88, 592. **12.** 420, 98, 282. **13.** 84 R4, 185, 63 R3.

Page 106

Aim: To teach a new problem pattern in division

Suggestions: Shopping at the store is an everyday activity for many children. Although a problem pattern is illustrated on this page, the real objective is to develop an awareness of shopping and of costs of articles. Many teachers will suggest that pupils report to the class on current prices of commonly purchased articles and make up class shopping problems.

Workbook Reference: Arithmetic Workshop, Book 4, page 44

Key: **1.** 10¢ ÷ 2 = 5¢. **2.** 15¢ ÷ 5 = 3¢. **3.** 12¢ ÷ 4 = 3¢. **4.** 54¢ ÷ 2 = 27¢. **5.** 50¢ ÷ 2 = 25¢. **6.** 15¢ ÷ 3 = 5¢.

Page 107

Aim: To provide further practice in the four fundamental operations

Workbook Reference: Arithmetic Workshop, Book 4, page 48

Key: **1.** 800, 554, 688, 755. **2.** 582, 733, 63, 385. **3.** 935, 2545, 1820, 2460. **4.** 87, 63 R1, 59, 94 R3. **5.** 38, 37, 31. **6.** 13, 52, 32. **7.** 800, 1248, 496, 828, 1424, 596. **8.** 412, 1520, 924, 1860, 2348, 1984. **9.** 1000, 1560, 620, 1035, 1780, 745; 515, 1900, 1155, 2325, 2935, 2480. **10.** 61, 51, 67, 47 R1, 39, 42 R4. **11.** 96, 28 R3, 52, 58, 75 R1, 79. **12.** 76 R1, 63 R3, 83 R3, 59, 48 R3, 53 R2; 120, 35 R3, 65, 72 R2, 94, 98 R3. **13.** 30 min.; 37 min.; 2 hr., 15 min. **14.** 1 hr., 25 min.; 17 min.; 49 min. **15.** 1539, 2102. **16.** 1424, 2000.

Page 108

Aim: To present a new subtraction thought pattern

Suggestions: Place the word *difference* on the class vocabulary chart. Once this word is understood, the problems on this page will be easily solved.

Workbook Reference: Arithmetic Workshop, Book 4, page 47

Key: **1.** 7 in. − 4 in. = 3 in. (longer). **2.** \$5.00 − \$3.47 = \$1.53 (difference). **3.** 10 years − 6 years = 4 years (difference). **4.** 34 in. − 20 in. = 14 in. (difference). **5.** \$8.79 − \$2.98 = \$5.81 (difference). **6.** 65 pounds − 39 pounds = 26 pounds (difference).

Page 109

Aims: To reteach what $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$ of an object is; to teach the new vocabulary word *fraction*

Suggestions: Begin the period with a review of what $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ mean. Use circles, squared pieces of paper, candy wrappers, and other objects to reteach the meaning of the unit fraction. Up to this point, these fractions have been manipulated and discussed, but the word *fraction* has not been used. As you show the pupils what $\frac{1}{2}$ of an object is, remind them that the word *fraction* means "broken" and that $\frac{1}{2}$ of something is a broken part of a whole object. If some children ask about the adding of fractions, show them how $\frac{1}{2}$ and $\frac{1}{2}$ make a whole object; therefore, fractions can be added to get a whole number. This is an important learning, and the meaning of a fraction should be stressed continuously as the year progresses. Use objects freely to help pupils secure answers to ex. 6 and 7.

Workbook Reference: Arithmetic Workshop, Book 4, page 45

Key: **1.** One half; $\frac{1}{2}$. **2.** B, one fourth or one quarter; C, one third; D, one fifth; $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$. **4.** A; halves; D; fifths. **5.** Yes. **6.** Larger; smaller. **7.** Smaller; larger. **8.** One fourth, one third, one half, one fifth.

Pages 110–111

Aim: To extend the meaning of fractions to include such fractions as $\frac{2}{3}$, $\frac{3}{4}$, $\frac{3}{5}$

Suggestions: The work in fractions to this point has been confined to unit fractions: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$ of a single object or a group of objects. The pupils will need help in understanding what the fraction two thirds *means and how it is written.* It is well to assist pupils in the realization that the number below the line represents the number of parts into which the object is "broken"; the number above the line indicates the number of parts you have. Avoid the use of the word *denominator* at this level. The use of a flannelboard with fractional parts will greatly assist in this learning. The problems on page 111 will suggest many supplementary activities which can be used to further develop this important learning.

Key: Page 110 **1.** One fourth; one fourth; no; yes. **2.** Squares C and F. **3.** One fifth; one third. **4.** 5 fifths; 2 fifths; 3 fifths. **5.** 3 thirds; 3 thirds. **6.** Picture G; A, B, C, and F; H. **7.** $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{2}{3}$, $\frac{3}{5}$, $\frac{4}{5}$, $\frac{3}{4}$, $\frac{3}{3}$.

Page 111 **1.** Three fifths, three fourths (or quarters), one half, two thirds. **2.** $\frac{3}{5}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{2}{3}$; $\frac{2}{5}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{3}$. **3.** One fourth. **4.** $\frac{2}{4}$; $\frac{1}{2}$. **5.** $\frac{3}{4}$; $\frac{1}{4}$. **6.** Three fourths; $\frac{3}{4}$. **7.** One fourth; three fourths. **8.** Two thirds; $\frac{2}{3}$.

Pages 112–113

Aim: To teach how to divide dollars and cents by 1-figure numbers

Suggestions: Dollars and cents are divided just like any other numbers; and pupils do not have to wait for the work in the division of decimals, taught in Grade 6, to understand the simple skill involved in this work. Ample practice has been provided in *American Arithmetic, Grade 4* in dividing 4-figure numbers by a 1-figure number and in stressing the importance of understanding place value when quotient figures are written. Pupils will profit from some simple suggestions and directions, such as:

(1) The decimal point in the quotient must be placed directly above the decimal point in the dividend.

(2) Be sure to remember whether you are dividing dollars, dimes, or pennies; and place your answer in the quotient in the proper position.

The explanation may be extended as follows: "Look at the example at the right of the page. It calls for dividing 2 dollars and 6 dimes by 4. How many times can you divide 2 dollars by 4? (no times). Then we will change the 2 dollars to dimes and combine with the 6 dimes. Now we have 26 dimes. How many times can we divide 26 dimes by 4? (6 times). We place the 6 in the dimes place. Now we multiply 6 by 4 and get 24. By subtracting 24 from 26, we have two dimes left over. We change these dimes to pennies and have 20 pennies. We divide 20 pennies by 4 and get 5. We place the 5 in the pennies place as we talk about pennies. So the answer reads: $.65 or 65¢. Let us check this answer by multiplication."

The remaining exercises on page 112 are completed in the same way. Pupils who have difficulty in placing the quotient figures correctly should be directed to study the examples in ex. 2, which show simple divisions with dollars and cents and the correct placement of the quotient figures. The real key to this learning is a *basic understanding of place value.*

Workbook Reference: Arithmetic Workshop, Book 4, page 46

Key: Page 112 **1.** Check by multiplying quotient by divisor. **3.** $.24, $.43, $.76, $.38, $.49. **4.** $.27, $.76, $.82, $.53, $.85. **5.** $.18, $.87, $.26, $.99, $.59. **6.** $.08, $.65, $.24, $.94, $.95. **7.** $.29, $.89, $.79, $.37, $.78. **8.** $.07, $.88, $.68, $.68, $.45.

Page 113 **1.** Check by multiplying $.97 by 4 and adding 2¢. **2.** $.16 R3¢, $.85, $.96 R4¢, $.77, $.59 R4¢. **3.** $.09 R2¢, $.32 R2¢, $.56, $.68 R4¢, $.66. **4.** $.16 R2¢, $.64 R4¢, $.67 R1¢, $.87, $.36 R1¢. **5.** $.14 R2¢, $.46 R1¢, $.77, $.86, $.35 R2¢. **6.** $.36 R1¢, $.72, $.78, $.92 R3¢, $.64. **7.** $.23 R1¢, $.26, $.98 R1¢, $.97 R1¢, $.84 R3¢. **8.** $.13 R2¢, $.94, $.66, $.62 R2¢, $.95 R2¢. **9.** $.83; yes, 1¢. **10.** $.68; 3 boys paid 1¢ extra.

Page 114

Aim: To provide oral review of simple measures and of arithmetical terms

Suggestion: Mental arithmetic must become more and more important and functional as the fourth-grade work unfolds. Encourage all pupils to do some work in mental arithmetic.

Key: **1.** 3, 3. **2.** 7, 2. **3.** 8, 4. **4.** quarter. **5.** minute, hour. **6.** pound. **7.** pint, quart. **8.** yard. **9.** difference. **10.** noon. **11.** Roman. **12.** quotient. **13.** product. **14.** sum.

Page 115

Aim: To continue work in solving problems without numbers

Suggestion: See the suggestions for teaching page 62.

Key: **1.** Multiply. **2.** Subtract. **3.** Divide. **4.** Subtract. **5.** Add. **6.** Divide. **7.** Add. **8.** Subtract.

Page 116

Aim: To allow pupils to try a series of mixed examples

Suggestion: Use the folded-paper method described on page 327 for ex. 1, 2, 3, 5, and 6.

Key: **1.** 132, 179, 141, 224, 153, 180, 174. **2.** 245, 231, 256, 1261, 5242, 2521. **3.** 316, 197, 577, 3511, 1402, 672. **4.** $5.02. **5.** 651, 620, 668, 476, 1518, 832.

6. 1895, 832, 912, 2250, 927, 3024. **7.** 29, 95, 83 R3, 68, 69. **8.** 73 R3, 93, 87 R2, 87 R1, 76 R2. **9.** $9.49.

Page 117

Aim: To present word problems related to Valentine's Day

Suggestions: The making of valentines is a fascinating activity. Most children of this age purchase valentine cutouts from the variety stores and make their own valentines. Here the pupils are given an opportunity to correlate art with arithmetic. Additional problems will arise as the pupils make their valentines. They may be written on the board by you or by the pupil suggesting the problem. Whenever you correlate arithmetic problem solving with real-life situations, the pupil becomes more aware of the fact that problem solving is an everyday activity and not just something that happens in arithmetic class. Good teachers continually attempt to dispel the somewhat prevalent notion that arithmetic as found in the world and arithmetic as taught in the classroom have no connection.

Key: **1.** $.25 + $.40 + $.60 + $.35 = $1.60. **2.** 5 × 12 hearts = 60 hearts. **3.** 4 × 15 hearts = 60 hearts. **4.** 60 hearts + 60 hearts = 120 hearts. **5.** 120 ÷ 2 = 60 (valentines). **6.** 60 − 48 = 12 (valentines). **7.** 60 valentines ÷ 2 = 30 valentines. **8.** 30 × 4¢ = $1.20.

Page 118

Aim: To review the major aims of Chapter 3

Suggestion: The test reviews seven of the nine aims listed in this Guide at the beginning of Chapter 3, as follows:

Chapter Review	*Aim Number*
Ex. 1 and 8	6
Ex. 2–4, 6	1
Ex. 5, 9, 10	4
Ex. 7	8
Ex. 11	7
Ex. 12–13	2
Ex. 14–15	3

Aim 9 is not tested at this time. Fraction work, as such, does not appear until the next grade.

Key: **1.** Yes. **2.** $1.65. **3.** 8 nickels. **4.** 30 pennies. **5.** Five. **6.** $825. **7.** $.85. **8.** 29°. **9.** 6¢, 11¢, $69, $.20. **10.** 14¢, 16¢, $80, $.75. **11.** 120; 120. **12.** 185, 450, 560, 1225, $8.75, $15.20. **13.** 430, 225, 1001, 3795, $9.84, $6.92. **14.** 12, 84, 33 R3, 74, 45. **15.** 18 R2, 53 R1, 86 R4, 35, 78.

Page 119

Aim: To present Problem Test 3

Suggestion: Aim 5 is very thoroughly reviewed and tested on this page.

Key: **1.** \$.35. **2.** 13°. **3.** 360 carrots. **4.** \$5.80. **5.** \$17.50. **6.** 105 animals. **7.** \$.75. **8.** 515 brown hens. **9.** \$1.10. **10.** 18 children.

Page 120

Aim: To provide a diagnostic test and suggested practice pages for the material developed in Chapter 3

Suggestion: A carefully graded and well-developed diagnostic test is presented on this page. Urge the pupils to make self-assignments to practice pages on the basis of the results of their achievement on this test.

Key: **1.** 26, 25, 28, 190, 203, 251. **2.** 4205, 7243, 2502, 576. **3.** 812, 565, 810, 698, 3444. **4.** 640, 1730, 875, 1036, 2460. **5.** 60, 21, 71, 90. **6.** 27, 89, 36, 49. **7.** \$.82 R2¢, \$.86 R1¢, \$.75 R2¢, \$.76 R2¢. **8.** 8, 5, 6.

Chapter 4

Aims of Chapter 4. The major aims of Chapter 4 are to:

1. Review the basic skills taught in the previous chapters.
2. Teach the multiplication facts of 6's and 7's together with their reverses.
3. Teach the basic even and uneven division facts relating to the 6's and 7's.
4. Teach how to find $\frac{1}{6}$ and $\frac{1}{7}$ of a number.
5. Extend the teaching of division with a 1-figure divisor to include 3-figure quotients, with dollars and cents.
6. Teach the calculation of elapsed time and the abbreviations for the days of the week.

Page 121

Aim: To develop a readiness for learning the multiplication facts of 6's

Suggestion: Projects of this kind, which occur frequently in *American Arithmetic, Grade 4,* both motivate the study of arithmetic and afford an excellent way to prepare the class for learning a new concept or skill. Notice how the multiplication facts of 6's are woven into the problems.

Key: **1.** 12; 18; 4 × 6 = 24 (buttons); 30 (buttons); 36 (buttons). **2.** 42; 42; 42, 48. **3.** Eight 6's are 48. Then nine 6's are 6 more than 48, or 54.

Page 122

Aim: To teach the multiplication facts of 6's

Suggestions: There are only four new multiplication facts on this page. The first six listed in ex. 1 were previously taught when the reverses of the 1's, 2's, 3's, 4's, and 5's were recognized. The only new facts on this page are:

$$\begin{array}{r}6\\ \underline{6}\\ 36\end{array}\qquad\begin{array}{r}6\\ \underline{7}\\ 42\end{array}\qquad\begin{array}{r}6\\ \underline{8}\\ 48\end{array}\qquad\begin{array}{r}6\\ \underline{9}\\ 54\end{array}$$

Pupils may verify the answers to these multiplication facts by adding. These four facts should be added to the pupils' multiplication charts. Ex. 6–9 provide excellent practice on all of the facts shown in ex. 1. Work similar to that shown in ex. 10 will prove invaluable to the pupil when work involving the multiplication of 3-figure numbers appears.

Key: **3.** 8 × 6¢ = 48¢. **4.** 9 × 6¢ = 54¢. **5.** 30; 42; 12; 36. **6.** 18, 24, 6. **7.** 42, 12, 54. **8.** 36, 30, 48. **9.** 54, 42, 24. **10.** 40, 34, 52; 58, 46, 28. **11.** 7 × 6 eggs = 42 eggs; 54 eggs; 24 eggs. **12.** 5 × 6 candies = 30 candies; 48 candies; 36 candies. **13.** 2 × 6 apples = 12 apples; 48 apples. **14.** 4 × 6¢ = 24¢.

Page 123

Aim: To teach the reverses of the multiplication facts of 6's

Suggestions: Sixteen of the nineteen facts listed in ex. 4 have already been learned and posted on the individual multiplication tables. Thus, there remain only three new facts to learn:

$$\begin{array}{ccc} 7 & 8 & 9 \\ \underline{6} & \underline{6} & \underline{6} \end{array}$$

Remind the pupils to place these three facts on their multiplication tables. Work similar to that shown in ex. 6 and 7 should be expanded.

Workbook Reference: Arithmetic Workshop, Book 4, page 52

Key: **2.** 6 × 7; 42; 42. **3.** 48; 48; 54; 54. **5.** 3 × 6 and 6 × 3, 5 × 6 and 6 × 5, 8 × 6 and 6 × 8, 4 × 6 and 6 × 4. **6.** 25, 16, 59. **7.** 58, 48, 3. **8.** 4 × 6 dishes = 24 dishes; 36 dishes; 42 dishes.

Pages 124–125

Aim: To re-emphasize the commutative law

Suggestions: Ex. 1 and 2 on page 124 reveal no new learning and are placed at the top of the page for continued practice and emphasis. However, ex. 3–5 of the same page enlarge the pupils' horizons in number manipulation. *This new idea should not be memorized* or presented from a drill mastery point of view. It is mainly an appreciation of our number system. Advanced pupils will quickly ask, "Does this mean that when we wish to multiply by 12, it is easier to multiply by 6 and then double the answer?" Naturally, the teacher is happy to secure such keen understanding of mathematics, and urges these better pupils to complete page 125 where more applications of this rule are found.

Key: Page 124 **5.** 3 × 6 = 18; 2 × 18 = 36, so 6 × 6 = 36.

Page 125 **4.** 16, 32. **5.** 14, 28. **6.** 18, 36. **7.** 24, 42, 20, 32, 48, 54, 28. **8.** 40, 36, 64, 24, 30, 72, 56. **9.** 20, 16, 36, 28. **10.** 24, 42, 48, 54.

Page 126

Aim: To extend the teaching of multiplying 3-figure numbers to include the multiplication facts of the 6's and their reverses

Workbook Reference: Arithmetic Workshop, Book 4, page 53

Key: **1.** 120, 606, 678, 1320, 702, 1428. **2.** 252, 1896, 750, 2868, 1554, 4236. **3.** 234, 1440, 4164, 3456, 1080, 5898. **4.** 90, 3624, 2142, 5340, 3888, 4770. **5.** 184 children. **6.** 84 children. **7.** 268 children. **8.** 330, 1296, 1440, 690, 1272, 1648. **9.** 432, 2424, 2322, 2282, 2580, 1998. **10.** 144, 654, 810, 636, 918, 2562. **11.** 138, 5082, 1716, 2400, 3696, 3552.

Page 127

Aim: To show the relationship which exists between arithmetic and cooking

Suggestions: The modern classroom will be sufficiently equipped for the actual cooking project outlined here. Certainly popcorn balls will be most acceptable to the boys in the class. Naturally, additional problems will arise during the cooking activity, and some of the facts found in these problems will need to be changed. Arithmetic is all around us!

Key: **1.** 2 tablespoons butter, 2 cups brown sugar, 8 tablespoons water. **2.** 7 minutes. **3.** 27 balls. **4.** 9 balls.

Page 128

Aim: To provide a quick oral review and a comprehensive written review of addition and subtraction

Suggestions: Ex. 1–5 are to be completed orally. Ex. 12–14 may be completed by means of folded paper as suggested on page 327 of the text.

Key: **1.** 8, 9, 33, 9. **2.** 43, 6, 52, 8. **3.** 7, 51, 26, 7. **4.** 9, 8, 59, 7. **5.** 6, 6, 43, 5. **6.** 389, 236, 80. **7.** 732, 282, 114. **8.** 602, 691, 154. **9.** 1405, 447, 155. **10.** 9 tickets. **11.** $29.25. **12.** 373, 119, 459, 1379, 6146, 854. **13.** 263, 428, 548, 453, 6262, 7970. **14.** 339, 308, 17, 578, 544, 2421.

Page 129

Aim: To introduce the even division facts of 6's

Suggestion: These facts are closely associated with their corresponding multiplication facts. As the pupils work out the answers to these facts, urge them to recheck any doubtful answers with their multiplication charts.

Key: **1.** 12 cupcakes ÷ 6 = 2 packages. **2.** 24 buttons ÷ 6 = 4 cards; 4. **3.** 18 stars; 6 stars; 3; 3. **4.** 5 circles; 5; 5. **5.** 7. **6.** 6, 6. **7.** 9, 9. **8.** 8, 8.

Page 130

Aim: To teach the even division facts of 6's

Suggestion: Ex. 1 arranges these division facts in their orderly sequence. Ex. 7–12 provide practice on them in random order. Refer, if needed, to the individual multiplication tables.

Workbook Reference: Arithmetic Workshop, Book 4, page 54

Key: **3.** 30¢ ÷ 6¢ = 5 (stamps). **4.** 24¢ ÷ 6¢ = 4 (oranges). **5.** 18 ÷ 6 = 3 (packages). **6.** 48 ÷ 6 = 8 (quarts); 8 ÷ 4 = 2 (gallons). **7.** 3, 9, 6. **8.** 8, 5, 7. **9.** 2, 4, 9. **10.** 9, 3, 6, 7. **11.** 2, 1, 5, 3. **12.** 7, 8, 4, 9.

Page 131

Aim: To teach how to find $\frac{1}{6}$ of a number

Workbook Reference: Arithmetic Workshop, Book 4, page 56

Key: **2.** One sixth; 4 stars; 4; 4. **3.** 3 dots; 3 dots; 3; 3. **4.** 12 eggs ÷ 6 = 2 eggs; 6 eggs. **5.** 48¢ ÷ 6 = 8¢; 5¢; 9¢. **6.** $42 ÷ 6 = $7; $1; $3. **7.** $660 ÷ 6 = $110; $31. **8.** 24 oranges ÷ 6 = 4 oranges; 6 oranges; less.

Pages 132–133

Aim: To teach division of 3-figure numbers by 6 when remainders are present

Suggestions: There is no new process work involved on these pages, but pupils should work these problems the long way. This will tend to reinforce their understanding of the division operation and the 5 steps involved in such a procedure. Ex. 6–11 on page 133 provide ample practice where an even division fact is first met and then, in most examples, a final remainder is found.

Workbook Reference: Arithmetic Workshop, Book 4, pages 57 and 58

Key: **3.** 240 balls ÷ 4 balls = 60 (packages); no. **4.** 144 ÷ 2 = 72 (pairs); 2 things. **5.** 51 packages; yes, one star. **6.** 71 R2, 80 R1, 20, 40 R1, 50 R1. **7.** 70 R3, 51 R3, 70 R1, 61, 60 R1. **8.** 70 R5, 90, 40 R4, 41 R2, 50 R1. **9.** 31, 90 R2, 91, 81, 70 R2. **10.** 31 R3, 90, 61, 90, 40. **11.** 30 R4, 20 R3, 61 R1, 81 R2, 51 R1.

Page 134

Aim: To present some word problems around the central theme of "Fun in Winter"

Suggestion: Many children will find these problems most realistic at this time of year, and children in the warmer climates will be intrigued by such problems. Once the pupils are thoroughly interested in the topic, the problems will pose little difficulty either in concept recognition or in calculation.

Key: **1.** $2.10. **2.** $.70. **3.** $6.20. **4.** Yes; 22°. **5.** 9 weeks. **6.** 28 da. **7.** 60 in.; 7 in.

Page 135

Aim: To test vocabulary words by means of a completion test

Key: **1.** midnight. **2.** fractions. **3.** degrees. **4.** fact. **5.** quarter. **6.** yard. **7.** remainder, difference. **8.** abbreviation. **9.** sum. **10.** quotient. **11.** nickel, dime. **12.** product. **13.** pt. **14.** ft. **15.** yd. **16.** da. **17.** hr. **18.** in. **19.** qt. **20.** min. **21.** gal.

Page 136

Aim: To teach the uneven division facts for the 6's

Suggestion: In ex. 3–5 the quotient and the remainder in each should be found by dividing in the long form as explained in ex. 2 on page 103 of the text. It is very important to compare the remainder with the divisor since this shows whether the quotient figure is correct. The remainder must always be smaller than the divisor.

Key: **2.** 43 ÷ 6 = 7 R1, or 7 flowers; 3 flowers. **3.** 6 R5, 5 R4, 8 R5, 7 R3, 4 R5, 8 R3, 0 R5. **4.** 3 R4, 9 R1, 9 R5, 2 R2, 2 R1, 6 R3, 1 R3. **5.** 5 R1, 4 R2, 5 R5, 9 R2, 4 R1, 8 R1, 0 R1. **6.** 45 ÷ 6 = 7 R3, or 7 plants; yes, 3. **7.** 25¢ ÷ 6¢ = 4 R1¢, or 4 tickets; yes, 1¢. **8.** 7 R2, 2 R5, 8 R4, 3 R2, 5 R3, 4 R3, 9 R4, 0 R3. **9.** 8 R2, 6 R1, 7 R4, 9 R3, 6 R2, 3 R5, 7 R1, 1 R2. **10.** 5 R2, 6 R4, 2 R4, 4 R4, 1 R5, 7 R5, 3 R3, 0 R2.

Page 137

Aim: To provide further practice in the division of 3-figure numbers by 6

Key: **1.** 92 ÷ 6 = 15 (packages), 2 left over. **2.** 150 ÷ 6 = 25 (packages). **3.** 253 ÷ 6 = 42 R1, or 42 packages. **4.** 57, 33, 79 R1, 93 R4, 29 R1. **5.** 71, 54 R1, 60 R4, 46, 98 R2. **6.** 39 R2, 81 R5, 25 R3, 34 R1, 52 R5. **7.** 41 R4, 22, 97, 17 R5, 80 R2. **8.** 84, 85, 52, 72 R2, 24 R3. **9.** 62, 50 R1, 19 R4, 36 R4, 23. **10.** 19, 75, 48 R2, 90 R1, 35.

Page 138

Aim: To teach how to calculate elapsed time

Suggestions: Most children think in terms of day to day or week to week. The events of the past are buried deep in history, and looking back 10, 20, 30, 40, or more years is not part of their daily environment. Therefore, teachers must approach the teaching of calculating elapsed time as an abstract learning. In problem 1, the year 1925 is far removed from the life of a ten-year-old child of today. The example explains that the year the school was built is to be subtracted from the present year. Thus the pupil is given a rule, which can soon be put to use again in problem 4. However, ex. 2 and 3 are different from 1 and may need some teacher guidance. Some teachers will develop further this skill in calculating years by referring to local landmarks, such as a firehouse, a town hall, a church, a football field. If there is a trophy case in the school, compute how many years ago a certain trophy or prize was awarded. Sometimes classrooms will contain pictures and gifts inscribed with the year of the donating class. Allow the better pupils to answer the first few questions and then extend the learning activity to the whole class.

Key: **10.** 8 weeks.

Page 139

Aim: To present problems without numbers

Suggestion: See the suggestions for teaching page 62.

Key: **1.** Add. **2.** Divide. **3.** Multiply. **4.** Divide. **5.** Subtract. **6.** Multiply. **7.** Add. **8.** Divide.

Page 140

Aim: To present the first work in 3-figure quotients, with and without remainders

Suggestions: This is the first work in division with 3-figure quotients. Ex. 1 should be carefully studied. In presenting this work to the pupils, place the model example on the board so that you can point to each step in explaining the work. The work should be checked by multiplying and adding the remainder, if any, as was done on page 78 of the text.

Workbook Reference: Arithmetic Workshop, Book 4, page 59

Key: **2.** 500 sheets ÷ 4 = 125 sheets. **3.** 154, 245, 962 R2, 393 R2, 531 R2. **4.** 395, 639, 754 R1, 819, 767 R1. **5.** 156 R3, 445 R2, 785 R4, 819, 293 R1. **6.** 327 R1, 212 R3, 895, 859 R1, 968. **7.** 134 R3, 975, 578, 498 R1, 689. **8.** 139 R4, 548 R3, 613 R3, 267 R2, 873 R1, 527 R2. **9.** 154 R1, 428 R4, 918, 613 R1, 781, 231 R4.

Page 141

Aim: To provide oral practice

Key: **1.** 6, 48, 21, 34. **2.** 35, 16, 9, 57. **3.** 5 R1, 42, 13, 29. **4.** 14, 15, 3 R1, 38. **5.** 6 R1, 54, 74, 16. **6.** Minute(s), yard(s), quart(s), inch(es), hour(s), gallon(s), foot(feet). **7.** (Largest to smallest) $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$. **8.** 10; 5; 2; 2, 5. **9.** Feet, quarts, quarts, quarts, feet, quarts, feet, feet. **10.** 1¢. **11.** 26 min. **12.** 50 min. **13.** 28 min.

Pages 142–143

Aim: To present word problems dealing with a winter trip

Key: Page 142 **1.** 3 weeks. **2.** 49° warmer; no; yes.

Page 143 **7.** 9 pounds. **8.** 70 times. **9.** 82 pounds (difference). **10.** 5 places; thirty thousand.

Page 144

Aim: To continue problem solving

Key: **1.** 24 in. **2.** 2 in.; 0 in. **3.** $1.43. **4.** $.57. **5.** 831 tickets. **6.** $1.14. **7.** 75 cookies. **8.** $.75; $.50; $.25; $.65.

Page 145

Aim: To extend the teaching of 3-figure quotients to include dollars and cents

Suggestions: The work on this page is a simple extension of the process taught on pages 112 and 113. Pupils who understand the division process and are firmly grounded in place value will experience no difficulty in making this simple extension. Stress that the decimal point in the quotient appears directly above the decimal point in the dividend because the dollars and cents in the quotient are found directly from the dollar and cents placement in the dividend. If it seems easier to talk in terms of dollars, dimes, and cents, do so.

Workbook Reference: Arithmetic Workshop, Book 4, page 61

Key: **1.** 1 boy. **2.** $1.66; 2 boys. **3.** $3.12, $4.15 R3¢, $6.18 R4¢, $5.24. **4.** $8.46 R1¢, $5.65, $2.35, $9.98. **5.** $2.73 R3¢, $5.79, $4.35 R5¢, $2.81. **6.** $7.29, $8.67, $7.14, $8.57.

Page 146

Aim: To provide practice

Suggestions: Although the instructions at the top of the page call for "copy, add, and check," the better pupils should be encouraged to give the answers to ex. 1–5 quickly. For instance, in ex. 1, a pupil may recite as follows:

"8, 15, 24, 27. The answer is 27."
"3, 11, 17, 24. The answer is 24."
"7, 16, 22. The answer is 22."

In similar fashion many pupils will be able to look at ex. 6 and 7 and give an immediate answer to some examples, and advanced pupils can do the work in ex. 8–12 mentally. However, anyone who wishes to do the work with pencil and paper should be permitted to do so. Thus a comparison will be made by the entire class between the ease of mental arithmetic and the more tedious nature of pencil-and-paper arithmetic. Until a pupil is convinced that mental arithmetic pays, he is very likely to use the pencil-and-paper method.

Key: **1.** 27, 24, 22. **2.** 26, 27, 24. **3.** 28, 26, 23. **4.** 29, 30, 23. **5.** 20, 30, 24. **6.** 362, 353, 618, 4623, 2807, 1546. **7.** 52, 359, 235, 1397, 464, 897. **8.** 159, 143, 132, 98, 57, 181. **9.** 114 R3, 34 R1, 66 R4, 113 R5, 153 R3, 359. **10.** 24, 128 R4, 87, 137 R2, 76, 631 R2. **11.** 125 R2, 85, 113 R1, 84, 59, 728. **12.** 141, 117, 161 R1, 79 R1, 90 R1, 232. **13.** 4032, 3504, 1330, 676, $18.24, $13.12. **14.** 876, 4158, 2920, 834, $11.20, $57.42.

Page 147

Aim: To teach the multiplication facts of 7's

Suggestions: All but three of the multiplication facts related to the 7's have already been taught. The new facts are $7 \times 7 = 49$; $8 \times 7 = 56$; $9 \times 7 = 63$. Ex. 4 and 5 indicate to the pupil the way of figuring out the answers to the facts of 7's if one is forgotten. For instance, $5 \times 7 = 35$ can be recalled from knowing $4 \times 7 = 28$ *and adding* 7. Similarly $6 \times 7 = 42$ can be recalled by knowing $5 \times 7 = 35$ *and adding* 7. A study of the individual multiplication table constructed by each pupil will tend to assist in this generalization and make quite clear the *additive nature of multiplication.* Some teachers will encourage pupils to discover the new facts in this lesson by the additive method suggested above, and then place them on the individual multiplication tables.

Workbook Reference: Arithmetic Workshop, Book 4, page 63

Key: **1.** 7 days; 14 days; 14; 14. **2.** 21 days; 21; 21. **3.** 28 days; 28; 28. **4.** 35; 35; 35. **5.** 42; 42; 42. **6.** 49; 49; 49. **7.** 56; 63. **8.** 56; 63. **9.** 63; 63. **10.** 56; 56.

Page 148

Aims: To review the multiplication facts of 7's; to teach their reverses

Suggestions: There are only two new facts on this page, namely: $\begin{array}{r}8\\ \underline{7}\end{array}$ $\begin{array}{r}9\\ \underline{7}\end{array}$. Both of them can be discovered easily by using the commutative law. Instruct pupils to post them on their multiplication tables. Many teachers will hold a review at the close of this lesson and include all multiplication facts taught to date. Always use the expression, "seven 8's are 56" as well as "7 times 8 are 56."

Key: **1.** 7×8; 56; 56. **2.** 63; 63. **5.** $7 \times 8¢ = 56¢$. **6.** 56, 42, 63. **7.** 35, 56, 28. **8.** 49, 63, 42. **9.** 60, 46, 67; 39, 60, 32; 53, 67, 46. **10.** 28, 35, 0, 49, 63, 14, 0, 7, 21.

Page 149

Aim: To use the 7's in multiplying 2-figure and 3-figure numbers

Suggestion: Most of these examples involve single and double carrying, and several in ex. 8–10 contain zeros in the minuend.

Key: 1. 3 × \$.23 = \$.69. **2.** 7 × \$.69 = \$4.83. **3.** 4 × \$.23 = \$.92; 7 × \$.92 = \$6.44. **4.** 7 × \$.75 = \$5.25; \$6.44 − \$5.25 = \$1.19. **5.** 152, 2492, 2051, 4998, \$19.60, \$13.65. **6.** 329, 1876, 2863, 1372, \$26.18, \$13.23. **7.** 441, 4032, 2388, 3024, \$60.90, \$18.60. **8.** 476, 1939, 5110, 1323, 5803, 5019. **9.** 259, 3199, 3990, 4242, 1925, 973. **10.** 588, 875, 2835, 1176, 4340, 2821.

Page 150

Aim: To provide an oral review

Suggestions: All the exercises on this page are easy enough to be done mentally. Ex. 6 provides practice in adding by endings, a very important skill because it is used constantly in column addition and in carrying in multiplication. Additional practice in adding by endings is easily provided through oral exercises in counting by 2's, 3's, 4's, 5's, and so on, beginning at different starting points. Examples of such exercises are given below.

(1) Beginning with 10, count by 3's to 46. Repeat, counting by 4's.

(2) Beginning with 11, count by 4's until you pass 50. Repeat, beginning with 7 and counting by 5's.

(3) Beginning with 12, count by 6's until you pass 50. Repeat, beginning with 4 and counting by 7's.

It is evident that many different exercises of this kind can be made. In each case tell the pupil where to start and where to stop. In order to limit the length of each exercise, it is advisable to stop counting as soon as the sum exceeds 50 or 60. A few minutes devoted to counting of this kind will be a valuable part of any oral review.

Key: 1. (See answers for these pages.) **2.** 19, 22, 5, 23. **3.** 24, 18, 22, 14. **4.** 19, 27, 4, 7. **5.** 20, 22, 15, 40. **6.** 37, 83, 50, 102, 68, 89, 64, 21; 40, 86, 53, 105, 71, 92, 67, 24; 36, 82, 49, 101, 67, 88, 63, 20; 41, 87, 54, 106, 72, 93, 68, 25; 39, 85, 52, 104, 70, 91, 66, 23. **7.** 86, 70, 24, 11, 52, 33, 68, 4; 91, 75, 29, 16, 57, 38, 73, 9; 93, 77, 31, 18, 59, 40, 75, 11. **8.** 90, 68, 85, 93, 42, 23, 63, 35. **9.** 94, 77, 78, 40, 60, 70, 30, 70. **10.** 4, 3, 6, 7, 15, 24, 23, 40; 126, 169, 186, 109, 57, 164, 87, 80. **11.** 55, 38, 86, 70, 28, 4, 6, 9; 69, 44, 98, 82, 40, 38, 54, 81.

Page 151

Aim: To review addition and subtraction

Suggestion: Advanced pupils will be able to do some of the examples by mental arithmetic. However, permit the use of pencil and paper when needed. Ex. 3 will probably prove too difficult to complete by mental arithmetic at this point.

Workbook Reference: Arithmetic Workshop, Book 4, page 62

Key: 1. \$69.03, \$84.93, \$69.64, \$39.00, \$53.45. **2.** \$58.06, \$85.15, \$67.02, \$87.55, \$56.92. **3.** \$25.93, \$.41, \$44.46, \$16.30, \$26.39; \$28.72, \$80.21, \$6.78,

$58.33, $40.80. **4.** 28, 24, 25. **5.** 28, 23, 24. **6.** 33, 26, 30. **7.** $18.75 + $19.39 = $38.14; $19.39 − $18.75 = $.64. **8.** 18, 428, 273, 475. **9.** 389, 27, 115, 259. **10.** 4460. **11.** $10.05. **12.** 93, 79, 595, 5194, 8378, 4754. **13.** 264, 644, 33, 6813, 2158, 510.

Pages 152–153

Aim: To teach the even division facts of 7's

Suggestion: Notice the correlation between multiplication and division. Ex. 5 on page 153 lists these facts in sequence, and ex. 9–13 provide excellent practice on them.

Workbook Reference: Arithmetic Workshop, Book 4, pages 64–65

Key: Page 152 **1.** 21 ÷ 7 = 3 (cars); 3; 3. **2.** 4; 4. **4.** 6. **5.** 7; 7. **6.** 56; 8; 8. **7.** 63; 9. **8.** 7, 7. **9.** 9, 9. **10.** 6, 6. **11.** 8, 8.

Page 153 **1.** 28 ÷ 7 = 4; 7 ÷ 7 = 1; 42 ÷ 7 = 6. **2.** 7 × 7 = 49; 9 × 7 = 63; 3 × 7 = 21; 8 × 7 = 56; 2 × 7 = 14. **3.** 35 ÷ 7 = 5 (weeks); 9 weeks; 3 weeks; 2 weeks. **4.** 42 ÷ 7 = 6 (weeks). **7.** 35¢ ÷ 7¢ = 5 (cupcakes). **8.** 14¢ ÷ 7¢ = 2 (candy bars). **9.** 6, 9, 7, 5. **10.** 8, 3, 9, 2. **11.** 4, 7, 3, 8. **12.** 5, 2, 6, 7. **13.** 9, 1, 2, 4.

Page 154

Aim: To teach how to find $\frac{1}{7}$ of a number

Suggestion: Notice that every example on this page is related to an even division fact. This prepares the way for the work on page 156, which teaches the uneven division facts of 7's.

Key: **2.** $\frac{4}{7}$, $\frac{5}{7}$, $\frac{2}{7}$. **3.** One seventh; 2 pennies; 2; 2. **4.** 3 dots; 3 dots; 3. **5.** 28¢ ÷ 7 = 4¢; 6¢; 1¢. **6.** 5, 3, 6, 4. **7.** 7, 2, 9, 8.

Page 155

Aim: To extend the reading of the calendar to include abbreviations for days of the week and measurement of elapsed time

Suggestions: Up to this point the calendar has been used primarily to determine the day of the week. Reference has been made to the seasons of the year, the number of full weeks in every month, the number of days in a month, and the variation which occurs in the number of days to a month. The work in ex. 1 can be correlated with written English, which may be developing the concept of abbreviations about this time of year. References to Monday dates in April can be extended to the date of Easter, the day of the week of Memorial Day this year, and so on. Ex. 10–13 develop even further the work started on page 138.

Key: **2.** 6, 13, 20, 27. **3.** Add 7 four times. **4.** 9, 16, 23, 30; 5. **5.** 1, 8, 15, 22, 29; 3, 10, 17, 24, 31. **6.** 30 days; 4 weeks, 2 days; 4; 4 R2. **7.** 31 days; 4 weeks; yes, 3 days. **8.** Yes, February, except in leap year. See page 218. **9.** No. **10.** May 18. **11.** August 24. **12.** June 22. **13.** October 29.

Page 156

Aim: To use the calendar as motivation for the study of the uneven division facts for the 7's

Suggestions: Ex. 1–5 pose problems which deal with the calendar and the number of full weeks represented in 40 days, 58 days, and so on. Naturally, the solution to these problems depends upon the uneven division facts for the 7's. Ex. 6–12 provide ample practice. Be certain that pupils understand these facts before continuing.

Key: **1.** 5 weeks, 5 days; June 13. **2.** 8 weeks, 2 days. **3.** 9 weeks, 5 days. **4.** 5 weeks, no days. **5.** 4 weeks, 3 days. **6.** 9 R4, 8 R3, 3 R3, 2 R1, 5 R3, 6 R2, 0 R5. **7.** 3 R5, 6 R5, 9 R3, 5 R2, 6 R3, 2 R5, 1 R2. **8.** 7 R5, 4 R1, 2 R4, 9 R5, 5 R1, 6 R6, 0 R4. **9.** 9 R6, 3 R2, 4 R2, 8 R1, 1 R6, 7 R6, 0 R2. **10.** 8 R4, 3 R1, 7 R2, 2 R3, 7 R4, 6 R1, 0 R1. **11.** 4 R5, 8 R6, 3 R6, 8 R5, 4 R4, 7 R3, 1 R1. **12.** 1 R3, 4 R6, 5 R6, 4 R3, 2 R6, 1 R5, 0 R6.

Page 157

Aim: To extend the division of 3-figure and 4-figure numbers by using 7 as a divisor

Suggestions: The first work with 4-figure dividends was introduced on page 140. Success in completing these examples rests on:

(1) a mastery of the even division facts of 7's
(2) an understanding of place value
(3) a knowledge of the 5 steps in the division process

It is suggested that you review these three things as ex. 1–3 are done by the entire class. As the pupils complete ex. 4–11, observe their work habits and guide those who are still uncertain of place value and/or the division process steps. If pupils hesitate on the even division facts, provide special practice for them by using flash cards.

Workbook Reference: Arithmetic Workshop, Book 4, page 68

Key: **1.** 31, 31; 82 days. **2.** 11 weeks, 5 days. **3.** $22. **4.** 23, 137 R1, 26 R1, 71 R3, 118 R5, 365. **5.** 28 R4, 122 R5, 35 R5, 94, 68 R1, 613. **6.** 112, 88 R4, 73, 131 R1, 113 R1, 428 R4. **7.** 88, 61, 48, 18 R2, 54, 739. **8.** $52.50 ÷ 7 = $7.50. **9.** 59 R4, 133, 24, 285 R5, 976 R1. **10.** 37 R1, 81 R2, 112 R4, 279 R1, 642 R6. **11.** 56, 86 R3, 114 R2, 545 R3, 229 R4.

Page 158

Aims: To provide oral practice in finding fractional parts of a number; to provide further practice in adding by endings

Key: **1.** 7 bars. **2.** 45¢. **3.** 84 eggs. **4.** 135 sheets. **5.** 71¢. **6.** 8 pounds. **7.** (a) $\frac{2}{3}$; (b) $\frac{1}{2}$; (c) $\frac{1}{4}$; (d) $\frac{3}{4}$. **8.** 30, 42, 55, 80, 21, 49, 68, 17; 33, 45, 58, 83, 24, 52, 71, 20; 31, 43, 56, 81, 22, 50, 69, 18; 32, 44, 57, 82, 23, 51, 70, 19. **9.** 95, 61, 69, 26, 38, 82, 84, 43; 98, 64, 72, 29, 41, 85, 87, 46; 96, 62, 70, 27, 39, 83, 85, 44; 97, 63, 71, 28, 40, 84, 86, 45. **10.** 25, 46, 29, 77, 34, 50, 63, 18, 80; 15, 36, 19, 67, 24, 40, 53, 8, 70; 30, 51, 34, 82, 39, 55, 68, 23, 85.

11. 71, 60, 53, 85, 22, 68, 54, 20, 41; 61, 50, 43, 75, 12, 58, 44, 10, 31; 76, 65, 58, 90, 27, 73, 59, 25, 46. **12.** 47, 50, $1.00; 19, 20, 25, 50, $1.00; 25, 50, $1.00; 60, 65, 75, $1.00; 38, 39, 40, 50, $1.00; 26, 30, 40, 50, $1.00; 13, 15, 25, 50, $1.00.

Page 159

Aim: To review the major aims of Chapter 4

Suggestion: This review test covers five of the six aims listed in the Guide at the beginning of Chapter 4, as follows:

Chapter Review	*Aim Number*
Ex. 1–5	4
Ex. 6, 7, 13	1 and 2
Ex. 8–12; 14–15	3 and 5

Key: **1.** 6, 13, 42, 84. **2.** 11, 15, 31, 95. **3.** 8, 9, 51, 29. **4.** 5, 12, 87, 59. **5.** 9, 16, 72, 37. **6.** 455, 336, 2562, 2618, $55.53, $54.16. **7.** 48¢. **8.** 7; 4; 9. **9.** 4 weeks, 3 days. **10.** 9 weeks, 3 days. **11.** $.14. **12.** $.23. **13.** $3.15. **14.** 65, 83 R2, 225, $9.74 R1¢, $4.13. **15.** 82, 113, 271, $3.54, $9.38.

Page 160

Aim: To present Problem Test 4

Suggestion: The problems on this page are devoted almost entirely to situations involving money, but they include thought patterns in all four of the fundamental operations.

Key: **1.** $18.55. **2.** $1.45 change; two dimes, 1 quarter, a dollar bill. **3.** 16 weeks, 3 days. **4.** 37¢. **5.** $.85. **6.** 89¢. **7.** 150 packages. **8.** 70 stamps. **9.** $2.75. **10.** $3.25.

Pages 161–162

Aim: To provide a comprehensive diagnostic test together with practice pages for addition, subtraction, multiplication, and division

Suggestions: As this chapter is a consolidation of learnings to date, the diagnostic test is spread over two pages. Page 161 deals primarily with addition, subtraction, and multiplication, whereas page 162 is devoted entirely to division. *This is the time to stop* and make certain that pupils are acquiring a good mastery of these four fundamental operations. Build special remedial programs for those who show weakness in a particular phase of this work. Reteach with emphasis on meanings whenever necessary.

Key: Page 161 **1.** 25, 27, 22, 121, 197, 110. **2.** 1012, 1139, 1683, 7998, 9917. **3.** 246, 80, 134, 255, 479. **4.** 1304, 2313, 496, 1397. **5.** 712, 990, 867, $17.30, $10.71. **6.** 738, 4440, 3690, $17.88, $8.48. **7.** 3052, 1715, 1503, $26.60, $15.19.

Page 162 **1.** 6 R1, 6 R2, 6 R1, 9 R3, 7 R2. **2.** 9 R2, 3 R3, 5 R4, 8 R1, 4 R4. **3.** 8 R5, 3 R2, 7 R3, 6 R1, 4 R4. **4.** 7 R1, 5 R4, 9 R2, 2 R2, 3 R4. **5.** 78, 87 R1, 64, 95. **6.** 58, 72 R4, 96 R3, 34. **7.** 38 R1, 95, 29 R5, 64. **8.** 145, 139 R3, 277, 239. **9.** $4.69, $1.61, $1.87 R2¢, $1.62. **10.** 56 R3, 85 R5, 429, 734. **11.** 43, 75, 69 **12.** 56, 37, 49. **13.** 83, 57, 64. **14.** 29, 83, 76.

Chapter 5

Aims of Chapter 5. The major aims of Chapter 5 are to:

1. Review the basic skills taught in previous chapters.
2. Reteach the reading of the clock and correlate clock reading with the reading of radio and television schedules.
3. Reteach the basic understandings concerning multiplication and division relationships.
4. Teach the multiplication and division facts (even and uneven) relating to the 8's and the 9's.
5. Teach how to find $\frac{1}{8}$ and $\frac{1}{9}$ of a number.
6. Extend regrouping in subtraction to triple regrouping.
7. Develop interesting word problems around a field trip to the zoo and in connection with a party for parents.
8. Extend the reading of numbers and place value to six figures.
9. Extend the teaching of linear measure to include the *mile*.

Page 163

Aims: To reteach the reading of the clock; to correlate clock reading with radio and television schedules

Suggestions: The idea of using television and radio programs will not be new to those classroom teachers who followed the suggestions in this Guide for the lesson on page 4. Continued emphasis must be placed on the everyday uses of arithmetic, so that pupils will sense the naturalness of arithmetic and quantitative reasoning in their lives. The problems suggested on this page can be readily extended to include questions about local programs and particular interests of children. Information gathered about pupil interests in television may assist teachers who are attempting to build special reading programs for slow readers. Also, some teachers may be able to help pupils become more discriminate viewers of television.

Key: **1.** 10 minutes; 15 minutes. **2.** 30 minutes; 10 minutes. **3.** 10 minutes; 15 minutes; 25 minutes.

Page 164

Aim: To extend time experiences to include bus schedules

Suggestions: Work of a similar nature was proposed for page 4. Some pupils will be willing to bring local bus schedules and train timetables to class. Travel is always a fascinating subject, and the class will enjoy spending a day or so in an interesting unit of work dealing with travel. Possible teaching leads for such a unit might develop from a newspaper or magazine article on a colorful winter or spring resort, an interest in a plant manufacturing bicycles, or a recent trip taken by some pupil or his parent.

Key: **1.** 39 min., 31 min., 25 min., 12 min., 53 min., 52 min. **2.** 13 min. **3.** 16 min. **4.** Four forty-eight; 12 minutes to 5. **5.** 3:11 P.M. **7.** 12 hr.; 12 hr.; 24 hr. **8.** 7 hr.; 2 hr. **9.** 2 hr. 20 min.

Page 165

Aim: To reteach the measures of *second, minute, hour, day*

Suggestions: Stress is here placed on understanding the *second.* Some pupils may have wrist watches with sweep second hands which will measure short periods of time. An activity such as timing how long it takes a pupil to walk from the door of the classroom to a window or the monitor to take attendance will provide ample practice in calculating seconds. Also, many schoolroom clocks have sweep second hands and can be used for general classroom activity. If your school has an active physical-education program, you might borrow the instructor's stop watch. Some of the boys in the class will be glad to demonstrate how a stop watch operates and why it is used. Also, the school principal might use such a watch to conduct specialized testing programs.

Key: **1.** 120 sec.; 30 sec. **3.** 4 sec. **4.** 60 sec.; 4 examples. **5.** 10 min. **6.** 30 min.; 15 min.; 15 sec.

Page 166

Aim: To review addition and subtraction

Suggestions: Although all of the work on this page may be done with pencil and paper, ex. 1–5 may be completed by mental arithmetic. Encourage pupils to use mental arithmetic as much as possible.

Key: **1.** 24, 26, 27. **2.** 25, 28, 26. **3.** 28, 25, 32. **4.** 26, 22, 26. **5.** 20, 28, 25. **6.** \$19.84. **7.** \$19.34. **8.** \$2.40. **9.** 464, 118, 87, 3820, 3068, 4581. **10.** 572, 651, 146, 1343, 764, 3783. **11.** 39, 50, 105, 2352, 454, 2915. **12.** 289; 564. **13.** 2767. **14.** \$2.87.

Page 167

Aim: To present word problems arising from the planning of a class party

Suggestions: The solution of word problems in arithmetic must be more than an academic classroom activity. Pupils enjoy seeing the close relationship which exists between arithmetic as taught in the classroom and arithmetic in their daily living. The problem situation described on page 167 is repeated many times in modern schools. Your class may now be planning a class party. If so, many problems could be added to the ones found on this page. The alert teacher makes every effort to develop the pupils' ability to solve problems which arise in their everyday experiences. Textbook problems may appear unrealistic to children; hence this type of activity is occasionally essential. Encourage the pupils to adopt a scientific attitude toward problem solving by (1) stating the problem in simple words; (2) collecting accurate data; (3) drawing a valid conclusion.

Key: **1.** March 4. **2.** 18 + 24 + 28 = 70 (people). **3.** 5 × $.75 = $3.75. **4.** 70 × 3 sandwiches = 210 sandwiches. **5.** 9 × 16 pieces = 144 pieces; 144 ÷ 70 = 2 R4; yes. **6.** 6 packages of each. **7.** 2 packages.

Page 168

Aim: To teach the remaining four multiplication facts

Suggestions: Only four multiplication facts remain to be learned:

$$8 \times 8 = 64;\quad 9 \times 8 = 72;\quad 8 \times 9 = 72;\quad 9 \times 9 = 81$$

Encourage pupils to discover these answers from previously learned multiplication facts by studying their individual multiplication tables. When these four are learned, have them posted on the individual tables, thus completing the tables of 100 facts. Naturally, you will want to review the previously learned facts pertaining to the 8's and 9's, but give continued practice on the four new ones.

Key: **1.** 64; 64. **3.** 64. **4.** 36; 36, 72; 72; 72. **5.** 81; 81; 81. **7.** 8 × 9¢ = 72¢. **8.** 8 × 8¢ = 64¢. **9.** 9 × 9¢ = 81¢.

Page 169

Aim: To present all of the multiplication facts of 8's and 9's on one page

Suggestion: These facts are known as the most difficult facts to learn. Ex. 3–5 provide practice and prepare the way for the test on multiplication facts to be found on page 196.

Key: **3.** 45, 63, 64, 24, 40, 27, 72, 56, 54. **4.** 48, 9, 72, 54, 16, 36, 56, 0, 81. **5.** 36, 32, 48, 27, 40, 63, 32, 18, 45. **6.** 49, 67, 68, 28, 44, 31, 76, 60, 58; 52, 13, 76, 58, 20, 40, 60, 4, 85.

Page 170

Aim: To extend the multiplication of 3-figure numbers to include the multiplication facts of 8's and 9's

Suggestions: All of the examples on this page involve carrying and contain some of the 8 and 9 facts. Carefully observe the pupils as they complete this work so that you will be able to separate multiplication errors from addition errors. Notice that the addition calls for adding by endings, with bridging. For instance, in ex. 5,

the addition fact in $\begin{array}{r}280\\8\\\hline\end{array}$ is 16 + 6;

the addition facts in $\begin{array}{r}493\\9\\\hline\end{array}$ are 81 + 2 and 36 + 8;

the addition facts in $\begin{array}{r}156\\9\\\hline\end{array}$ are 45 + 5 and 9 + 5.

Workbook Reference: Arithmetic Workshop, Book 4, page 69

Key: **1.** 16 × 8 girls = 128 girls. **2.** 8 × \$30 = \$240. **3.** \$135. **4.** \$240 ÷ 2 = \$120, yes; yes, \$135 − \$120 = \$15. **5.** 2240, 4437, 1404, 3024, 7236, 5766. **6.** 1458, 5856, 4232, 5913, 3367, 1960. **7.** 688, 760, 3344, 2456, 5032, 4504; 774, 855, 3762, 2763, 5661, 5067. **8.** 152, 592, 5056, 1160, 6296, 1712; 171, 666, 5688, 1305, 7083, 1926. **9.** 416, 280, 6480, 6008, 3256, 2712; 468, 315, 7290, 6759, 3663, 3051.

Page 171

Aim: To review problem-solving skills

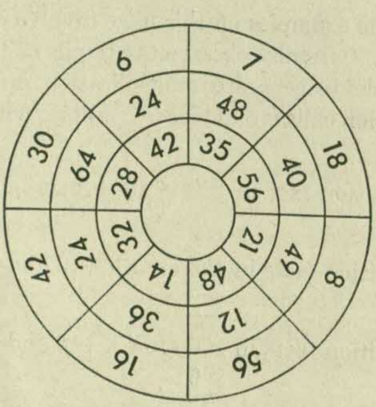
Suggestions: Before they begin the mechanics of solving the problem, ask the pupils to state the fundamental operation used in its solution. If a pupil does not see which operation to use, suggest that he *restate* the problem in simpler words. Sometimes a pupil will prefer to think of a similar problem for which he knows the solution. Avoid telling him the process to use or hinting that it is the same process as one used in some earlier example.

Key: **1.** Divide; 40¢ ÷ 7¢ = 5 R5¢; 5 tickets. **2.** Divide; 40¢ ÷ 5¢ = 8; 8 tickets. **3.** Subtract; 36 − 28 = 8 (pupils). **4.** Add; 8 + 13 + 9 + 6 + 15 = 51 (points). **5.** Subtract; 52 − 44 = 8 (children). **6.** Add; \$32.75 + \$4.85 = \$37.60. **7.** Multiply; 8 × \$.27 = \$2.16. **8.** Divide; 360 ÷ 7 = 51 R3, or 51 bunches; yes, 3 carrots. **9.** Add; 230 + 75 = 305 (stamps). **10.** Multiply; 6 × \$.48 = \$2.88. **11.** Subtract.

Page 172

Aim: To teach the even division facts of 8's

Suggestions: All of the work on this page is directly related to multiplication. After the pupils have mastered the facts as presented in ex. 8, provide practice in which they can recall these facts when arranged in random order. Some teachers build a large number wheel with all the multiples of 6, 7, and 8 around the outside of the wheel and leave a place in the center to place either a 6, a 7, or an 8, as shown below.



The class decides which number to place in the center of the wheel. Then another class member begins pointing at the various numbers around the wheel. If the designated number allows an even division with the number in the center, the answer is given. Otherwise, the correct answer is "Pass." Such a wheel may be used to test uneven division facts. The pupils will then give the answer and the remainder.

Workbook Reference: Arithmetic Workshop, Book 4, page 70

Key: **1.** $24 \div 8 = 3$ (tables); 3; 3. **3.** 4; 4. **4.** 7, 7. **5.** 9, 9. **6.** 6, 6. **7.** 8, 8. **9.** 16¢ ÷ 8¢ = 2 (candy bars). **10.** 56¢ ÷ 8¢ = 7 (tickets).

Page 173

Aim: To teach how to find $\frac{1}{8}$ of a number

Suggestions: It is time to teach the pupil that the denominator of the fraction represents the number of parts into which an object is broken, and that to find $\frac{1}{8}$ of a number you divide it by 8, or the denominator. This understanding is basic to all fraction work — *the denominator is the divisor.* Although this understanding should not be placed in the form of a memorized rule, constant use of the principle tends to make it a part of the behavior pattern of the pupil. Ex. 6–8 give further practice on this important principle.

Key: **1.** One eighth; $\frac{1}{8}$; $\frac{8}{8}$. **2.** 3; 3; 3. **3.** 5; 8; 2; 4; 9; 7; 1; 3; 6. **4.** 110, 31, 90, 101, 41, 61. **5.** 20, 50, 81, 70, 91, 111. **6.** One fourth; three fourths. **7.** Two eighths; six eighths; one half. **8.** Yes; yes.

Pages 174–175

Aim: To present word problems related to a trip to the zoo

Suggestions: This is an extension of the problems first suggested on pages 44–45. If the zoo was not visited last fall, now is the time to plan a spring trip. The problems on these two pages are realistic in nature and cover most of the things that would be seen at the zoo. Ex. 11 makes an excellent springboard from which to encourage pupils to make up problems of their own.

Key: Page 174 **1.** 58 animals. **2.** 1 hr. 25 min. **3.** \$.75. **4.** \$.10. **5.** 22 fish.

Page 175 **6.** 4 × 55 lb. = 220 lb. 5 × 55 lb. = 275 lb. The turtle weighed 5 times as much as Jack. **7.** 2265. **8.** 13 older monkeys. **9.** 14,200 pounds. **10.** 12 deer.

Page 176

Aim: To reteach the function of the remainder in a division example

Suggestions: Many pupils will have memorized this rule: "If the remainder is larger than the divisor, the quotient is wrong."

The authors believe that pupils must know also the *why* of a skill as well as the mechanics of the skill itself. In ex. 1, the entire concept of a remainder in division is discussed. Sally wants to buy some cream puffs and has only 65¢ with which to make the purchase. The cream puffs cost 8¢ each. Knowing the even division facts of 8, she realizes that 64¢ will be needed to buy 8 cream puffs. Only 1¢ remains. That means that there is not enough money left over to buy another cream puff. However, had Sally guessed that 7 cream puffs were her purchasing limit, she would have spent 56¢ and had 9¢ left over. As she would have had more than 8¢ left, she could have purchased another cream puff. The pupil thus sees that the remainder must be smaller than the divisor. In like manner, if Sally had said to the clerk, "I should like 9 cream puffs," the cost would have been 72¢; she could not have paid 72¢ since she had only 65¢. Thus the pupil is led to the realization of what division is and its close relationship to subtraction. Ex. 3 further develops this idea, and teachers may feel free to go even deeper into this discussion with any group of pupils who do not fully comprehend the meaning of the remainder in division. The next page provides ample practice on the uneven division facts of 8.

Workbook Reference: Arithmetic Workshop, Book 4, page 71

Key: **1.** 1 cent. **2.** No. **3.** Example 1, quotient too large, 60 ÷ 8 = 7 R4; example 2, correct; example 3, quotient too small, 68 ÷ 8 = 8 R4; example 4, quotient too large and subtraction wrong, 58 ÷ 8 = 7 R2; example 5, quotient too large, 50 ÷ 8 = 6 R2. **4.** 25¢ ÷ 8¢ = 3 (bars), 1 cent left; 6 bars, 7¢ left; 3 bars, 6¢ left; 4 bars, 3¢ left. **5.** 0 R7; 1 R3; 5 R5; 8 R6.

Page 177

Aim: To provide extensive practice in the uneven division facts of 8's

Suggestion: The uneven division facts of 8's are far greater in number than the uneven facts of 2's and 3's. A number wheel similar to that shown for page 172 of the Guide will be enjoyed by the pupils.

Key: **1.** 2 R6, 8 R5, 3 R7, 6 R4, 1 R5, 4 R5, 7 R5, 0 R4. **2.** 9 R4, 4 R2, 9 R1, 3 R3, 9 R6, 5 R4, 6 R5, 0 R2. **3.** 4 R7, 8 R2, 2 R1, 6 R3, 1 R4, 4 R6, 9 R2, 0 R1. **4.** 1 R2, 2 R3, 4 R1, 9 R5, 5 R3, 2 R5, 1 R7, 0 R6. **5.** 3 R4, 8 R7, 9 R7, 2 R7, 2 R2, 7 R3, 8 R3, 0 R3. **6.** 45 ÷ 8 = 5 (pages) R5; 5 pictures. **7.** 72 ÷ 8 = 9 (pages). **8.** 8 × 64 pictures = 512 pictures. **9.** 7 R1, 4 R4, 5 R7, 1 R6, 7 R4, 9 R3, 1 R1. **10.** 5 R6, 6 R6, 3 R2, 7 R2, 4 R3, 5 R5, 0 R5. **11.** 6 R1, 3 R5, 7 R7, 8 R6, 5 R1, 7 R6, 0 R7.

Page 178

Aim: To extend the division of 4-figure numbers to include divisors of 8

Suggestions: Once again the pupils are given an opportunity to demonstrate their ability to master the division operation. All process difficulties are found in these examples, such as offset quotients, zeros in the dividend, zeros in the divisor, and final remainders. In ex. 9–12 the dividend becomes dollars and cents, thus requiring a decimal point and a dollar sign placed in the quotient. Teachers should observe carefully those pupils who place quotient figures inaccurately. Stress place value with such pupils.

Workbook Reference: Arithmetic Workshop, Book 4, page 72

Key: **1.** \$78.80 ÷ 8 = \$9.85. **2.** \$2.88 ÷ 8 = \$.36. **3.** \$2.88 ÷ 6 = \$.48. **4.** 90 R5, 61, 77, 247, 339 R3. **5.** 42 R1, 114, 33, 935, 512. **6.** 85 R5, 48, 54, 488, 751. **7.** 69, 123 R7, 37 R6, 313, 776 R4. **8.** 112, 26, 72, 678, 911 R2. **9.** \$.12, \$.45 R3¢, \$3.12 R4¢. **10.** \$.05 R5¢, \$.86 R2¢, \$1.73. **11.** \$.11, \$.57 R3¢, \$4.96. **12.** \$.11 R2¢, \$.90 R3¢, \$2.94 R7¢.

Page 179

Aim: To provide mixed practice (oral and written)

Suggestion: Encourage more advanced pupils to do some examples orally.

Key: **1.** 296, 1664, 3648, 1576, 2632, 4480; (× 9): 333, 1872, 4104, 1773, 2961, 5040; (× 6): 222, 1248, 2736, 1182, 1974, 3360; (× 3): 111, 624, 1368, 591, 987, 1680. **2.** (× 8): 752, 5368, 4160, 6680, 5936, 3344; (× 9): 846, 6039, 4680, 7515, 6678, 3762; (× 6): 564, 4026, 3120, 5010, 4452, 2508; (× 3): 282, 2013, 1560, 2505, 2226, 1254. **3.** (× 8): 656, 2352, 1544, 3744, 2448, 6008; (× 9): 738, 2646, 1737, 4212, 2754, 6759; (× 6): 492, 1764, 1158, 2808, 1836, 4506; (× 3): 246, 882, 579, 1404, 918, 2253. **4.** (× 8): 632, 2936, 7320, 6800, 1136, 6688; (× 9): 711, 3303, 8235, 7650, 1278, 7524; (× 6): 474, 2202, 5490, 5100, 852, 5016; (× 3): 237, 1101, 2745, 2550, 426, 2508. **5.** 171. **6.** 239. **7.** 222. **8.** \$16.27. **9.** \$18.58. **10.** \$10.03. **11.** 9, 36 R2, 52, 1976. **12.** 11 R4, 292, 2754, 113. **13.** 62, 184, 38, 26. **14.** 19, 19, 6083, 4068. **15.** 162, 888, 98 R3, 76. **16.** 33, 84, 3272, 244. **17.** 1179, 2124, 6292, 1791, 1231. **18.** 3884, 1296, 3402, 2542, 6195.

Page 180

Aim: To teach the even division facts of the 9's

Suggestions: These are the last 10 division facts to learn with the exception of the 1's listed on page 184. Now is the time to review the previously learned division facts. Naturally, all of these new facts are correlated with multiplication. Ex. 11–13 provide practice on them.

Key: **2.** 27; 3; 3. **3.** 4; 4. **4.** 6, 6. **5.** 9, 9. **6.** 7, 7. **7.** 8, 8. **9.** 45¢ ÷ 9¢ = 5 (balloons). **10.** 27¢ ÷ 9¢ = 3 (crayons). **11.** 2, 5, 1, 7. **12.** 3, 6, 4, 2. **13.** 7, 8, 9, 6.

Page 181

Aim: To teach how to find $\frac{1}{9}$ of a number

Suggestion: The fraction $\frac{1}{9}$ seldom occurs in the daily life of children or adults. The only real purpose of including it at this time is to stress again the fact that $\frac{1}{9}$ of a group of objects is found by dividing the group by 9.

Key: **1.** One ninth; $\frac{1}{9}$; $\frac{2}{9}$; $\frac{4}{9}$; $\frac{5}{9}$. **2.** One ninth; 3 dots; 3. **3.** 5, 9, 2, 8, 4, 6, 1, 3, 7. **4.** 11, 70, 110, 711, 310. **5.** 10, 81, 60, 1110, 911. **6.** 45¢ ÷ 9 = 5¢. **7.** 72 ÷ 9 = 8 (cakes).

Page 182

Aim: To teach the uneven division facts of 9

Suggestions: The textbook provides ample practice on the uneven division facts of 9. Some teachers will use the same list of dividends to recheck pupil accuracy on the uneven facts of 8, 7, and so on. If pupils prefer the wheel approach to this lesson, you will find it easy to arrange the numbers in wheel form.

Workbook Reference: Arithmetic Workshop, Book 4, page 74

Key: **1.** 32 ÷ 9 = 3 R5, or 3 trips; 5 books left. **2.** 40 ÷ 9 = 4 R4, or 4 trips; 4 books left. **3.** 4 R5, 5 R8, 6 R8, 2 R5, 1 R6, 3 R7, 3 R2, 0 R4. **4.** 6 R4, 8 R5, 2 R8, 7 R6, 5 R2, 2 R3, 1 R4, 0 R7. **5.** 9 R5, 1 R2, 3 R5, 6 R3, 8 R8, 2 R7, 4 R2, 0 R1. **6.** 1 R1, 7 R7, 7 R2, 5 R7, 4 R3, 7 R4, 4 R6, 0 R3. **7.** 4 R8, 3 R8, 5 R4, 1 R5, 2 R2, 6 R7, 5 R5, 0 R6. **8.** 8 R3, 9 R6, 6 R2, 3 R6, 9 R8, 8 R7, 5 R1, 0 R2. **9.** 6 R6, 7 R3, 8 R6, 9 R1, 8 R2, 9 R4, 7 R8, 0 R5. **10.** 2 R4, 9 R3, 4 R4, 9 R7, 7 R5, 4 R1, 6 R1, 0 R8. **11.** 3 R4, 8 R1, 1 R3, 5 R3, 9 R2, 8 R4, 2 R6, 1 R8. **12.** 2 R1, 5 R6, 6 R5, 4 R7, 3 R1, 1 R7, 7 R1, 3 R3.

Page 183

Aim: To divide 3-figure and 4-figure numbers by 9

Suggestions: Any pupils who are demonstrating able mastery of division may be excused from much of this work, and very slow pupils need not finish the entire page. These examples are placed here for practice purposes and to continue to develop the skill needed in division.

Workbook Reference: Arithmetic Workshop, Book 4, pages 73 and 75

Key: **1.** 94, 22, 42, 568, 926 R2. **2.** 64, 56 R5, 74, 714 R8, 835. **3.** 95 R2, 57 R4, 46 R6, 595, 149. **4.** 26, 32 R7, 19, 784, 488. **5.** 25 rows. **6.** 44 stamps; 4 stamps left. **7.** \$.75. **8.** \$.65. **9.** 52, 89 R7, 81, 71, 227 R3, 777 R7. **10.** 39, 48, 31 R4, 54, 138, 267. **11.** 97, 67 R4, 43, 58 R6, 685, 928. **12.** 62, 84, 25 R4, 77 R8, 217, 894. **13.** 91 R8, 49 R6, 43 R3, 35, 226, 337 R7. **14.** 36 R3, 79, 59 R8, 76, 443, 636 R5.

Page 184

Aim: To teach the division facts of 1

Suggestions: The answer to all of these facts is self-evident to the pupil who understands the division operation. Any of these ten facts can be expressed as follows: "How many times can 1 be subtracted from . . . ?" Naturally the answer is the same as the number used for the dividend. Checking this obvious fact is done by multiplication. The learning of these division facts is facilitated by the generalization given after ex. 3.

Key: **1.** \$7 ÷ \$1 = 7 (books); 7. **2.** 9 ÷ 1 = 9 (children); 9; 9. **4.** 42, 74, 57, 96, 53, 79, 30, 91; 45, 77, 60, 99, 56, 82, 33, 94; 44, 76, 59, 98, 55, 81, 32, 93; 46, 78, 61, 100, 57, 83, 34, 95. **5.** 32, 64, 47, 86, 43, 69, 20, 81; 17, 49, 32, 71, 28, 54, 5, 66. **6.** 9 minutes. **7.** 69, 16, 28. **8.** 66, 56, 89.

Page 185

Aim: To teach a new subtraction concept

Suggestions: Numbers are compared in many ways. The easiest method is subtraction, although a very common method is by division or ratio. The problems listed on this page are only a small sampling of the many occasions in daily life for comparing numbers. Some pupils will enjoy completing a blackboard listing of ways in which they have compared numbers in the past day or two. Or you might suggest that pupils keep track of the ways in which they compare numbers between the present moment and the same hour tomorrow and report their findings.

Key: **1.** 5 plates; 3 cups; 5 − 3 = 2 (plates). **2.** 15 years − 9 years = 6 years. **3.** 1954 − 1948 = 6 years. **4.** 48 in. − 30 in. = 18 in. **5.** 50 ft. − 38 ft. = 12 ft. **6.** \$3.50 − \$2.75 = \$.75. **7.** \$22.50 − \$19.75 = \$2.75.

Pages 186–187

Aim: To extend place value and number reading to six figures

Suggestions: Some time has elapsed since the matter of reading and understanding numbers arose in the classroom. Begin the class by reviewing place value in relation to numbers in the tens, hundreds, and thousands. Review the pupils' understanding of such questions as:

In the number 5632,
How many ones are there?
How many hundreds are there?
How many tens are there?
How many thousands are there?
What figure appears in the hundreds place?
What figure appears in the tens place?
What are the different ways to read this number?

After pupils have shown an understanding of this 4-figure number, extend the number system to five places. Begin the exercises on page 186. Develop ex. 4 so that pupils will appreciate the value of the comma. Encourage the suggestion of numbers other than those used in ex. 5. Although the place pocket chart will be outgrown by this time, the vertical abacus may still prove very useful.

Workbook Reference: Arithmetic Workshop, Book 4, page 78

Key: Page 186 **1.** 5 places. **5.** Seventy thousand eight hundred sixty, 70 thousands, 8 hundreds, 6 tens, 0 ones; forty-five thousand two hundred one, 45 thousands, 2 hundreds, 0 tens, 1 one; ninety-five thousand six hundred twenty-four, 95 thousands, 6 hundreds, 2 tens, 4 ones; thirty-one thousand one hundred seventy-nine, 31 thousands, 1 hundred, 7 tens, 9 ones; twenty-eight thousand sixty-three, 28 thousands, 0 hundreds, 6 tens, 3 ones. **6.** 3 figures come after the comma. **7.** 10,000; 20,000; 30,000; 40,000; 50,000; 60,000; 70,000; 80,000; 90,000.

Page 187 **10.** 80,000; 90,000; 100,000; 110,000; 120,000. **12.** 3 thousand, 8 hundred 25, 3 thousands, 8 hundreds, 2 tens, 5 ones; 67 thousand 8 hundred 23, 6 ten-thousands, 7 thousands, 8 hundreds, 2 tens, 3 ones; 90 thousand 58, 9 ten-thousands, 0 thousands, 0 hundreds, 5 tens, 8 ones; 273 thousand 194, 2 hundred-thousands, 7 ten-thousands, 3 thousands, 1 hundred, 9 tens, 4 ones; 537 thousand 204, 5 hundred-thousands, 3 ten-thousands, 7 thousands, 2 hundreds, 0 tens, 4 ones.

Page 188

Aim: To provide a review in addition

Suggestions: You may wish to encourage pupils to avoid using pencil and paper in completing ex. 7–11. Fourth-grade pupils enjoy appearing to be grown up and when they read the instruction above ex. 7 and then are told that they may do this work mentally, they will be pleased. This type of compliment is quite necessary in the development of the child who constantly strives to appear adult.

Key: **1.** 11,631, 10,717, $190.88, $204.96, $62.97. **2.** 24,664, 18,201, $100.03, $140.24, $55.40. **3.** $101.85. **4.** $90.25. **5.** 330. **6.** 5232. **7.** 31, 133. **8.** 28, 217. **9.** 32, 200. **10.** 29, 231. **11.** 28, 344.

Page 189

Aim: To extend the regrouping idea in subtraction to triple regrouping

Suggestions: Review with the class the concepts of single and double regrouping. If you find it advisable to dramatize any of these review examples, use the suggestions given in this Guide for the lesson on page 29. When the regrouping operation is understood, then proceed with the work on this page. The problem of greatest difficulty is illustrated in example 2-A. The approach to this example was used in previous subtraction examples with zeros in the minuend.

Key: **3.** 3878, 2474, 4579, 1513, 1766, 2842.

Pages 190–191

Aim: To correlate problem solving with social studies

Suggestions: Here is another way to correlate arithmetic directly with social studies. Most fourth-grade pupils are familiar with children of other lands. If the social-studies work stresses correspondence and study of this type, these problems will prove most interesting. Ex. 10 on page 191 opens the study of long-distance mileage. Connected with this problem is the more pertinent one of how long it takes to reach these places by ship and plane. The arithmetic teacher has here a unique opportunity to introduce another dimension, namely, *time*. The basic question in travel today is, "How long does the trip take?" Teachers realize that New York-to-London by plane is an overnight trip, one of from ten to twelve hours. New York-to-Rome flights are also overnight, requiring about fifteen hours. A flight from New York to Venezuela is usually made in about eight hours by day. However, since a distance of only 500 miles by automobile consumes most of a day, distance should be thought of not only in terms of miles but in terms of method of travel and of time. Children will be fascinated by this new thought. Open their minds now to the modern concept of distance.

Key: Page 190 **1.** 24 × 4 pages = 96 pages. **2.** 32 × 4 pages = 128 pages. **3.** 32 pages. **4.** 36 cards. **5.** 36 ÷ 4 = 9 (pages). **6.** 24 ÷ 3 = 8 (pages).

Page 191 **7.** 7:30 P.M. **8.** 12 books. **9.** 43 pictures. **10.** Japan; Mexico. **11.** 9700 miles − 1941 miles = 7759 miles; 8178 miles − 3483 miles = 4695 miles.

Page 192

Aim: To review subtraction

Suggestion: The work in ex. 1 begins with a review of triple regrouping taught on page 189. Use the folded-paper method for ex. 1–4. Ex. 10–12 stress triple regrouping with zeros in the minuend.

Key: **1.** 3587, 6597, 3679, $55.38, $24.79. **2.** 426, 4927, 6889, $35.86, $28.96. **3.** 1789, 5567, 773, $25.98, $75.26. **4.** 949, 5879, 691, $14.77, $19.28. **5.** $13.15. **6.** $5.75. **7.** 6896. **8.** 5255 − 2758 = 2497. **9.** $19.58. **10.** 3714, 6427, 1056, 5983, 802, 4631. **11.** 2422, 88, 5964, 3439, 4755, 1193. **12.** 1206, 5517, 675, 6141, 3963, 2084. **13.** 4967, 7680, 2309, 7236, 2055, 5884; 3675, 1341, 7217, 4692, 6008, 2446; 2459, 6770, 1928, 7394, 5216, 3337.

Page 193

Aim: To improve ability in mental arithmetic

Suggestion: Most of the work on the previous pages has been of a pencil-and-paper variety. Encourage pupils to do this page mentally and to suggest more examples when the work is completed.

Key: **3.** 27 (or 27, 28, 29), 30, 40, 50, $1.00; 81 (or 81, 82, 83, 84), 85, 90, $1.00; 35, 40, 50, $1.00; 58 (or 58, 59), 60, 65, 75, $1.00; 73 (or 73, 74), 75, $1.00; 9, 10, 15, 25, 50, $1.00; 16 (or 16, 17, 18, 19), 20, 25, 50, $1.00. **4.** 50, 71, 91, 40. **5.** 80, 40, 21, 31. **6.** 71, 51, 91, 31. **7.** 80, 60, 50, 30. **8.** 61, 61, 70, 20. **9.** 49, 14, 0, 28, 7, 56, 21, 42, 63, 35; 56, 16, 0, 32, 8, 64, 24, 48, 72, 40; 63, 18, 0, 36, 9, 72, 27, 54, 81, 45. **10.** 20, 42, 64, 80, 24, 82, 40, 84; 30, 63, 96, 120, 36, 123, 60, 126; 40, 84, 128, 160, 48, 164, 80, 168. **11.** 4, 7, 5, 2, 6, 9, 8, 3. **12.** 8, 6, 4, 9, 5, 3, 2, 7. **13.** (smallest to largest) $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$.

Page 194

Aim: To extend the teaching of linear measures to include the *mile*

Suggestions: This page is concerned with the measuring of length. The pupils should study the yardstick and use it in measuring lengths on the schoolroom floor or on the playground. In order to acquaint pupils with longer lengths, measure a string 10 yards long and use it to measure a length along the sidewalk, such as 100 yards. Call attention to the length of the blocks in your town or city, thus giving the pupils an idea of the number of blocks that make a mile.

The distances in miles from your town or city to adjacent towns should also be discussed.

Key: **1.** 15 mi. **5.** 3 × 20 min. = 60 min., or 1 hr.; 60 min. ÷ 20 min. = 3 (mi.).

Page 195

Aim: To review abbreviations which refer to measures

Suggestions: If the class has been building a vocabulary chart this year, place this chart in front of the class and draw attention to the manner in which most measurements may be written in abbreviated form. Also construct flash cards on which these common abbreviations are written. After the pupils are acquainted with the abbreviations, have them complete ex. 3–14 on this page.

Workbook Reference: Arithmetic Workshop, Book 4 page 76

Key: **1.** Foot, gallon, mile, inch, yard, minute, second. **2.** Pint, Saturday, quart, hour, day, Monday, dozen. **3.** 36, 1760, 12. **4.** 2, 120, 240. **5.** 12, 48, 30. **6.** 5280, 8, 1. **12.** Below; nearer 80°. **13.** 9:52 A.M. **14.** 26 min.

Page 196

Aim: To review the 100 multiplication facts

Suggestions: See pages 7, 13, and 328 of the textbook for suggestions for giving this test.

Key: **1.** 10, 24, 4, 0, 16, 9, 0, 42, 4, 7. **2.** 0, 5, 21, 48, 9, 20, 12, 0, 15, 24. **3.** 28, 40, 0, 32, 0, 36, 2, 72, 8, 35. **4.** 7, 18, 81, 30, 1, 0, 12, 54, 24, 45. **5.** 45, 0, 8, 18, 54, 6, 64, 0, 56, 14. **6.** 0, 20, 3, 48, 27, 0, 32, 12, 40, 0. **7.** 63, 8, 15, 0, 35, 5, 16, 56, 25, 36. **8.** 14, 72, 21, 0, 36, 6, 0, 63, 18, 9. **9.** 24, 0, 12, 49, 2, 42, 16, 6, 0, 27. **10.** 6, 4, 18, 8, 0, 10, 3, 30, 28, 0.

Page 197

Aim: To reteach basic understandings concerning multiplication

Suggestions: This page reteaches the pupil how to figure out the answer to a multiplication fact if the answer is not at once evident. Six suggestions are made: (1) count out the fact using objects; (2) reduce the multiplication fact to an addition story and add; (3) use the commutative law; (4) remember that all zero facts have 0 as an answer; (5) remember that any number multiplied by 1 is the number itself; (6) take half of the multiplier and then double the product.

Key: **1.** 15; 15; 3, 6, 9, 12, 15; 15 dots; 5, 10, 15. **4.** 35; 35.

Page 198

Aim: To test the 90 even division facts

Suggestions: All the even division facts studied on the preceding pages are brought together on this page. If a pupil forgets the answer to a division fact like $7\overline{)56}$, he might ask, "How many 7's make 56?" His knowledge of the multiplication facts will tell him that 8 × 7 = 56, hence eight 7's make 56. This shows that 8 is the answer to $7\overline{)56}$. A pupil's knowledge of the division facts depends upon his knowledge of the multiplication facts. If a pupil does poorly on the test on the multiplication facts, he will do poorly on the test on the division facts. To correct a faulty mastery of division facts, first be sure that the pupil knows the multiplication facts.

Key: 1. 4, 0, 1, 9, 5, 7. **2.** 5, 3, 0, 8, 9, 7. **3.** 2, 1, 4, 7, 9, 9. **4.** 9, 3, 2, 2, 6, 8. **5.** 0, 1, 5, 7, 6, 8. **6.** 2, 7, 4, 5, 8, 8. **7.** 0, 1, 6, 6, 2, 4. **8.** 4, 0, 6, 3, 9, 7. **9.** 1, 8, 9, 5, 9, 8. **10.** 1, 0, 9, 6, 7, 5. **11.** 6, 1, 4, 3, 4, 5. **12.** 1, 2, 2, 3, 3, 7. **13.** 0, 2, 5, 8, 7, 5. **14.** 1, 0, 4, 8, 2, 6. **15.** 3, 0, 3, 3, 6, 4.

Page 199

Aim: To reteach basic understandings covering division

Suggestions: The textbook suggests two ways of discovering a division fact: (a) by referring to its related multiplication fact; (b) by thinking of its pair.

Key: 4. $12 \div 3 = 4$; $27 \div 9 = 3$. **5.** 5, 9, 7, 9, 6, 2, 4. **6.** 9, 7, 7, 8, 2, 8, 7. **7.** $10 \div 5 = 2$; $72 \div 9 = 8$; $14 \div 7 = 2$; $45 \div 9 = 5$; $24 \div 6 = 4$; $12 \div 2 = 6$; $20 \div 4 = 5$; $36 \div 9 = 4$; $21 \div 7 = 3$; $42 \div 7 = 6$; $56 \div 8 = 7$; $18 \div 2 = 9$; $32 \div 8 = 4$; $35 \div 7 = 5$.

Page 200

Aim: To review the major aims of Chapter 5

Suggestion: This review test covers five of the nine aims listed at the beginning of Chapter 5, as follows:

Chapter Review	*Aim Number*
Ex. 1–2	9
Ex. 3, 7	6
Ex. 4	1
Ex. 5	8
Ex. 6, 8–12	1 and 4

Aim 2 is an everyday classroom skill which can be evaluated informally, and aim 3 is not tested as it is an understanding rather than a skill. Aim 5 is not reviewed, and there is no ready method for testing aim 7.

Key: 1. 5280 ft. **2.** 1760 yd. **3.** 493 people. **6.** 11,998, 11,341, 7489, \$88.72, \$106.42. **7.** 2698, 2816, 1548, \$27.89, \$35.93. **8.** 5 R2, 9 R4, 4 R5, 6 R5, 3 R1, 8 R4, 2 R3, 3 R6; 4 R6, 8 R4, 4 R1, 5 R8, 2 R7, 7 R5, 2 R1, 3 R3. **9.** 1896, 3248, 6552, 6016, 1304, 7560; 2133, 3654, 7371, 6768, 1467, 8505. **10.** 35, 99, 69, 137, 555 R5. **11.** 78, 57, 87 R4, 544, 925. **12.** 92 R7, 19 R3, 95, 677, 419 R7.

Page 201

Aim: To present Problem Test 5

Key: 1. 1 hr. 17 min. **2.** \$.35. **3.** \$7.85. **4.** 55 mi. **5.** Yes; yes, \$1.16. **6.** 5 tickets; yes, 5¢. **7.** \$4.32. **8.** \$.48. **9.** \$6.80. **10.** \$1.55.

Page 202

Aim: To provide a diagnostic test with suggested practice pages

Suggestion: The work on this page is carefully graded and involves all four of the fundamental operations. Pupils should make their own assignments for the practice pages.

Key: **1.** 22,381, 15,538, 11,110, 10,992. **2.** 3735, 1949, 2675, 2947. **3.** 2736, 1568, 6064, 1672, 3496. **4.** 1926, 5310, 6147, 6516, 8685. **5.** 6 R7, 8 R5, 2 R1, 9 R3. **6.** 4 R3, 7 R2, 5 R5, 3 R4. **7.** 56, 74 R3, 193, 428. **8.** 82, 95, 111 R1, 437.

Aims of Chapter 6. The major aims of Chapter 6 are to:

1. Review the skills taught in the previous chapters.
2. Teach multiplication by 10, 20, 30, and so on.
3. Teach multiplication by 2-figure numbers and extend to include dollars and cents.
4. Teach how to check 2-figure multiplier examples by reversing the multiplicand and the multiplier.
5. Teach multiplication of dollars and cents by 10, 20, 30, and so on, using the offset multiplier method.
6. Teach how to estimate answers to examples.
7. Teach how to solve two-step problems.
8. Teach the importance of labeling an answer.
9. Teach the division of money by money.
10. Extend the teaching of Roman numerals to XXX.
11. Reteach the days of the month and teach the concept of leap year.

Page 203

Aim: To teach the multiplication of a number by 10

Suggestions: Using the closed-book approach to this lesson, begin with a review of place value:

5 tens or 5×10 are written as 50
8 tens or 8×10 are written as 80
3 tens or 3×10 are written as 30

Now, using the commutative law, *we know that if*

$5 \times 10 = 50$, *then* $10 \times 5 = 50$
$8 \times 10 = 80$, *then* $10 \times 8 = 80$
$3 \times 10 = 30$, *then* $10 \times 3 = 30$

It would thus appear that when a 1-figure number is multiplied by 10, the number is pushed over to the tens place and a zero (a place holder) is affixed to the number. In similar fashion, this reasoning may be extended to a 2-figure number multiplied by 10. For instance,

24 tens or $24 \times 10 = 240$ or $10 \times 24 = 240$

Thus follows the rule that is stated in the box on page 203. At this point, have the pupils open their books and go over the material presented. Ample practice is provided in ex. 5.

Key: **1.** 50; 50. **2.** 50. **4.** 10 × 24 pencils = 240 pencils. **5.** 40, 70, 80, 460, 150, 700, 270, 840, 390, 90, 60, 1000, 1930, 2000.

Page 204

Aim: To teach the multiplication of numbers by 20, 30, 40, and so on

Suggestions: Ex. 1–4 stress the commutative law and indicate how the answers may be determined. Ex. 8 shows pupils a short-cut method used in business. However, many pupils will more readily understand the process if emphasis is given to place value. In order to do this, write the examples in ex. 8 of the text as follows:

$$\begin{array}{r}34\\ \times 20\\ \hline\end{array}\qquad\begin{array}{r}12\\ \times 40\\ \hline\end{array}\qquad\begin{array}{r}25\\ \times 30\\ \hline\end{array}\qquad\begin{array}{r}13\\ \times 80\\ \hline\end{array}\qquad\begin{array}{r}60\\ \times 50\\ \hline\end{array}$$

Proceed to explain example 1 in this manner:

"The only multiplication needed in this example is in the tens place as there is a place holder (zero) in the ones place. So I say 2 tens × 4 are 8 tens. I write the 8 in the tens place; and so that we will know that it is in the tens place, I'll put a zero in the ones place to hold the place. Now 2 tens × 3 tens are 6 hundreds. I'll write the 6 in the hundreds place."

The remaining examples on the page are completed in the same way. *Emphasis is placed on the fact that only one multiplication is actually required* since there is a zero in the ones place of the multiplier. Thus, the only difference between these examples and the ones completed in previous chapters is that all of the multiplication takes place in the tens or higher places, and a zero is used to hold the place in the ones place. Pupils master this concept quickly and then turn to the short-cut method illustrated in the textbook.

Workbook Reference: Arithmetic Workshop, Book 4, page 79

Key: **1.** 60; 60. **2.** 80; 80. **3.** 100; 100. **4.** 120; 120. **5.** Multiply by 2 and add 0. **6.** Yes; multiply by 3 and add 0. **9.** 780, 1350, 1460, 840. **10.** 910, 2400, 1920, 1500. **11.** 900, 850, 3600, 990.

Page 205

Aim: To teach multiplication by 2-figure numbers

Suggestions: The previous lessons have served as an excellent introduction to this new process. Three different ways of understanding this work are listed on page 205. Using the example 15 × 16, these methods may be explained as follows:

1. The horizontal method:

$$\begin{array}{rlcr}5 & \text{(ones)} \times 16 & = & 80\\ \underline{10} & \text{(1 ten)} \times 16 & = & \underline{160}\\ 15 & \phantom{\text{(1 ten)}} \times 16 & = & 240\end{array}$$

2. The vertical method (long form):

$$\begin{array}{rl}16 & \\ \underline{15} & \\ 80 & (5 \text{ ones} \times 16)\\ \underline{160} & (10 \text{ ones} \times 16)\\ 240 & \end{array}$$

3. The vertical method (short form):

$$\begin{array}{r l} 16 & \\ \underline{15} & \\ 80 & (5 \text{ ones} \times 16) \\ \underline{16} & (1 \text{ ten} \times 16) \\ 240 & \end{array}$$

The use of method 2 is recommended until pupils fully understand the mechanics of 2-figure multiplication. Then allow those who wish to use the short form to drop the 0 in the second partial product.

Workbook Reference: Arithmetic Workshop, Book 4, page 81

Key: **2.** 216, 322, 575, 475, 180, 630, 416, 646. **3.** 224, 576, 294, 1056, 1056, 209, 564, 221.

Page 206

Aim: To teach checking of multiplication by reversing the position of multiplier and multiplicand

Suggestions: Review the commutative law as it applies to basic facts in multiplication. Then have the pupils open their books to page 101 and review the application of the commutative law to examples involving 1-figure multipliers. The extension of the principle to examples with a 2-figure multiplier is an easy step. Ex. 2 provides a new challenge to the pupil in that 2-figure multipliers appear in dollar-and-cent problems. Point out to the class that two examples leave a space in the partial products where the decimal point should go. Re-emphasize the need for accurate placement of numbers so that place value will be correct.

Workbook Reference: Arithmetic Workshop, Book 4, page 82

Key: **3.** 4988, 2610, 2067, 234, 6300, \$25.50, \$15.08. **4.** 837, 2583, 8004, 2852, 4275, \$42.32, \$17.48.

Page 207

Aim: To extend the multiplication of 2-figure numbers to real-life situations involving money

Suggestions: Problem 3 challenges the imagination and intelligence. Frequently a pupil will assume that *there is only one way* to complete an example. Here it is quite easy for the alert pupil to demonstrate an easy way to secure the answers without following the method of the textbook. This type of work is enrichment material for the better pupil. Ex. 4 is an excellent illustration of place value: 77 dimes or 77 tens or 770¢ or \$7.70. Less mature members of the class should be encouraged to use play money to find the answers.

Workbook Reference: Arithmetic Workshop, Book 4, page 88

Key: **1.** 54 × \$.25 = \$13.50. **2.** 13 × \$.50 = \$6.50. **3.** Yes; divide 13 by 2 and change to dollars and cents; yes; divide 54 by 4 and change to dollars and cents. **4.** 77 × \$.10 = \$7.70. **5.** 16 × \$.05 = \$.80. **6.** \$13.50 + \$6.50 + \$7.70 + \$.80 + \$.45 = \$28.95. **7.** Yes.

Page 208

Aim: To test basic understandings of measures by means of a multiple-choice test

Suggestion: The multiple-choice test was introduced in *American Arithmetic, Grade 3* and lightly touched on page 114 of *Grade 4*. The real purpose of this page is to evaluate understandings rather than to experience a new testing medium.

Key: **1.** years. **2.** inches. **3.** pounds. **4.** quarter. **5.** dozen. **6.** yards. **7.** days. **8.** glass. **9.** dollars. **10.** hours. **11.** days. **12.** degrees.

Page 209

Aim: To extend the teaching of Roman numerals to include XXX

Suggestions: The Roman number for 4 may be written as IIII or IV. The form IIII is the one often found on the clock and represents the earlier Roman practice. The form IV, which illustrates the subtractive principle, represents later Roman practice. Similarly, the Roman number for 9 may be written as VIIII or IX. Roman numbers are often used to number the volumes of a set of books, and to number the pages in the preface of a publication. Look at an unabridged dictionary and notice the use of Roman numbers to number the pages of the preface. A Roman number is often cut on the cornerstone of a church, library, or other public building to show the year in which it was erected.

Workbook Reference: Arithmetic Workshop, Book 4, page 89

Key: **2.** Three; I, V, and X. **7.** XIX, XVI, XXII, XXV, XXVIII, XV, XXVII, XXX. **8.** 21, 27, 20, 13, 16, 24, 18, 14, 23, 15, 25, 19, 17, 26.

Pages 210–211

Aim: To teach the solving of the two-step problem

Suggestions: The explanation of how to solve a two-step problem, given in ex. 3 on page 210, should have careful study. Teach the pupils to find the hidden question in the first step which must be answered before the second step can be answered. On page 211 continue to search for the hidden question in each problem before proceeding. Remember that the question asked in the problem is answered by working the second step.

Key: Page 210 **1.** 8¢ + 7¢ = 15¢. **2.** 25¢ − 15¢ = 10¢. **4.** How much did Ann spend all together? Yes.

Page 211 **6.** How much did he have in all? 38¢ + 25¢ = 63¢. 75¢ − 63¢ = 12¢. **7.** How many did she have all together? 63 buttons + 75 buttons = 138 buttons. 138 − 50 = 88 (buttons). **8.** How much of the dollar was left? $1.00 − $.48 = $.52. $6.87 + $.52 = $7.39. **9.** How much did Betty have in all? $8.89 + $1.75 = $10.64. $12.20 − $10.64 = $1.56. **10.** How many stamps in all did he buy? 2 × 75 stamps = 150 stamps. 235 + 150 = 385 stamps; multiply. **11.** How much did the cloth cost? 3 × $.89 = $2.67. $2.67 + $.49 = $3.16. **12.** What was each boy's share? $5.00 ÷ 2 = $2.50.

$2.50 − $.85 = $1.65. **13.** How much did the rolls cost? 40¢ ÷ 2 = 20¢. 20¢ + 65¢ = 85¢. **14.** How much did the tickets cost? 2 × 35¢ = 70¢. 70¢ + 15¢ = 85¢.

Page 212

Aim: To review the skills of addition, subtraction, multiplication, and division

Workbook Reference: Arithmetic Workshop, Book 4, pages 80 and 83

Key: **1.** 46 R3, 234, 75, 147 R2, 856. **2.** 98, 175, 478 R1, 593, 849. **3.** 289, 79 R6, 137, 362, 973 R2. **4.** 219, 238. **5.** 229, 302. **6.** 267, 220. **7.** 216, 246. **8.** 257, 276. **9.** $21.00. **10.** $9.00. **11.** $3.75. **12.** $6.60. **13.** 2919, 5686, 159, $9.16, $47.33. **14.** 2588, 847, 941, $42.92, $39.49. **15.** 12,465, 13,002, 12,855, $72.84, $100.91; 5640, 16,737, 17,059, $78.28, $74.27.

Page 213

Aim: To alert pupils to the need for labeling the answer to a word problem

Suggestions: The mechanical solution of a word problem is meaningless. The primary objective of solving word problems is to secure accurate and intelligent answers. The pupil must know what the answer he secures represents — is it apples, bears, children, dollars, or what? The need for labeling answers becomes more acute as the pupil encounters more and more two-step problems. Make labeling the answer a requirement for all future word problems.

Key: **2.** 125 × 6 carrots = 750 carrots. **3.** 175 × 4¢ = 700¢ or $7.00. **4.** 250 × 3¢ = 750¢ or $7.50. **5.** 135 × 2¢ = 270¢ or $2.70. **6.** 144 × 5¢ = 720¢ or $7.20. **7.** 132 × 7¢ = 924¢ or $9.24. **8.** 475 × 9¢ = 4275¢ or $42.75. **9.** 150 × 6¢ = 900¢ or $9.00.

Pages 214–215

Aim: To present two-step problems centered around a trip to the grocery store

Suggestions: Shopping at a supermarket is a common experience for many children today. Those who do not shop in a big market probably patronize smaller stores that adopt many supermarket practices, such as the "Serve Yourself" one. In such shopping situations, it is important for the customer to know how much an item costs, and to realize approximately how much he has spent before he arrives at the cashier's station. The alert teacher will plan an activity unit around the problem situations described on pages 214–215. Some worthwhile shopping experiences will result, such as:

1. Finding present prices of popular grocery items
2. Estimating broken lot costs, *i.e.*, ½ doz., ¼ lb., 1 can marked 3/25
3. Estimating mentally the total cost of a series of 3–8 articles

Workbook Reference: Arithmetic Workshop, Book 4, pages 86–88

Key: Page 214 **1.** $.93; How much did the beans cost? Add. **2.** 6 × $.05 = $.30. $.30 + $.15 = $.45. **3.** 3 × $.59 = $1.77. $5.00 − $1.77 = $3.23. **4.** $1.00 − $.24 = $.76. $.76 ÷ 4 = $.19.

Page 215 **5.** \$.60 ÷ 2 = \$.30. \$.30 + \$.20 = \$.50. **6.** \$.22 + \$.15 + \$.25 + \$.19 = \$.81. \$.81 ÷ 3 = \$.27. **7.** \$6.54 + \$3.75 + \$5.66 = \$15.95. \$20.00 − \$15.95 = \$4.05. **8.** 12 × \$.07 = \$.84. \$.84 ÷ 4 = \$.21. **9.** \$.06 + \$.05 = \$.11. 30 × \$.11 = \$3.30. **10.** \$3.00 − \$1.86 = \$1.14. \$1.14 ÷ 3 = \$.38.

Page 216

Aim: To provide further experience with two-step word problems

Suggestions: All children enjoy earning money and thrill at selling something they have made themselves. Almost all of the items listed on this page are handicraft items. Although 9-year-olds would not engage in such craft projects alone, they like to think in terms of ability to do so. The underlying aim in presenting this page of craft problems is to arouse pupil interest in handwork. The need for such a hobby or skill is great in our present highly mechanized civilization. As the working week becomes shorter and shorter, the need for adequate use of leisure time becomes greater. Every person needs a hobby or craft to which he can turn when the working day is over. These word problems may well be the beginning of pupil interest in this area. Those who wish to bring to class some of the things they have made should be encouraged to do so.

Key: **1.** 6 × \$1.00 = \$6.00. \$6.00 − \$3.60 = \$2.40. **2.** \$3.60 ÷ 6 = \$.60. \$1.05 − \$.60 = \$.45. **3.** \$1.50 − \$1.05 = \$.45. 8 × \$.45 = \$3.60. **4.** 8 × 12 cards = 96 cards. 96 × \$.08 = \$7.68. **5.** \$3.90 ÷ 6 = \$.65. \$1.00 − \$.65 = \$.35. **6.** \$1.25 − \$.85 = \$.40. 12 × \$.40 = \$4.80.

Page 217

Aim: To provide an oral review

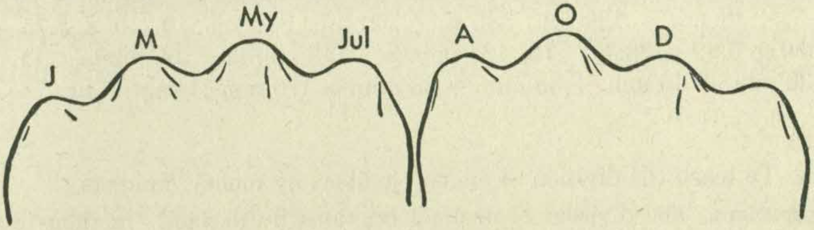
Suggestions: Insist that pupils do all of this work mentally. Ex. 12–14 provide excellent practice material for work in 1-figure and 2-figure multiplication. Some pupil-teachers will enjoy making up similar exercises and asking various class members to give the answers.

Key: **1.** 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45. **2.** 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44. **3.** 3, 8, 13, 18, 23, 28, 33, 38, 43, 48. **4.** 36 in. **5.** 7, 3, 5, 9, 6, 8, 1 R1, 0 R4. **6.** 80, 90, 110, 600, 230, 420, 140, 310; 160, 180, 220, 1200, 460, 840, 280, 620. **7.** $\frac{1}{3}$. **8.** 9:12, 6:47, 11:24, 2:38. **9.** 20, 16, 23, 15, 19, 27, 14. **10.** 3 pennies, 1 nickel, 1 dime; 1 dime, 1 quarter, 1 half dollar; 2 pennies, 1 nickel, 1 half dollar; 1 nickel, 1 dime, 1 half dollar; 1 nickel, 1 dime, 1 quarter, 1 half dollar; 1 dime, 1 quarter; 1 penny, 1 nickel, 1 dime, 1 quarter. **11.** 46, 23, 51, 67, 72, 45, 8, 28. **12.** 46, 57, 34. **13.** 35, 34, 23. **14.** 40, 71, 61.

Page 218

Aim: To reteach the number of days in each month of the year

Suggestions: The rhyme in ex. 9 is the commonest way for us to recall the number of days in a month, but the knuckle rule is another way. Suggest that the children place their clenched fists together in a manner similar to that shown in the diagram. Encourage them to look carefully at the knuckles of the clenched fists. These knuckles represent the 31-day months. The valleys between the knuckles represent the 30-day months, except, of course, February, which has 28 days. The exception is discussed at length on page 219.



Some pupil may know that an organization known as the World Calendar Association is actively promoting a new calendar which would substitute a quarter system for the present system. Although such a plan is in existence, it appears that few countries are interested in adopting a calendar reform now.

Workbook Reference: Arithmetic Workshop, Book 4, page 93

Key: **1–2.** January, February, March, April, May, June, July, August, September, October, November, December. **3.** December 25; yes. **4.** November; no. **5.** January, March, May, July, August, October, December. **6.** April, June, September, November. **7.** February.

Page 219

Aim: To teach the meaning of "leap year"

Suggestions: One of the difficult things to understand about our calendar is the extra day for February every four years. Pupils will enjoy studying how the sun affects our calendar and be interested to learn that it takes about 365¼ days for the earth to travel around the sun. Thus every four years an extra day is necessary to balance the calendar. Actually the calendar is not quite balanced because every 100 years there is no leap year unless the year can be divided by 400. Thus the year 2000 will be a leap year; but the years 1700, 1800, and 1900 were not leap years. The audio-visual section at the back of this Guide will list some filmstrips which can be secured to help answer questions about leap year. Also, the review table on this page lists many of the measures relating to time. The new measures deal with the weeks in the year, days in the year, and leap year.

Key: **2.** 1872, 1904, 1944, 1952. **3.** 1948, 1952, 1956, 1960, 1964, 1968.

Page 220

Aim: To extend pupil experiences with two-step problems

Suggestions: Unlike the problems dealing with hobbies (page 216) or marketing (page 214), these problem situations embrace a variety of activities. However, two major themes keep running through the problems — *time* and *money*. Such themes make the problems very realistic since most adult problems deal with the same two topics.

Key: **1.** \$.90 ÷ 2 = \$.45. \$.45 + \$.65 = \$1.10. **2.** \$3.00 ÷ 4 = \$.75, \$1.75, \$.15. **3.** 2 × \$.26 = \$.52. \$.52 + \$.45 = \$.97. **4.** 3 × \$1.35 = \$4.05. \$5.00 − \$4.05 = \$.95. **5.** 375 × \$.10 = \$37.50. **6.** \$2.00 − \$.35 = \$1.65. **7.** 50 marbles + 25 marbles = 75 marbles. 75 marbles − 6 marbles = 69 marbles. **8.** 5 × 38 mi. = 190 mi.; 380 mi.; 760 mi.; 874 mi. **9.** 10 × \$.75 = \$7.50. \$7.50 + \$.89 = \$8.39. **10.** 185 points − 148 points = 37 points. **11.** 25 min. + 30 min. + 45 min. + 35 min. + 35 min. = 170 min.; nearer 3 hr.

Page 221

Aim: To teach the division of money numbers by money numbers

Suggestions: The division of decimal fractions by decimal fractions is a sixth-grade arithmetic activity. However, the work on this page is easily accomplished if this simple direction is followed: "*change the dividend and divisor to cents and divide as usual.*" No mention need be made of a decimal point because all numbers change to whole numbers expressed in cents. After the pupils discuss problems 1–3, then ex. 4 becomes:

$$5\overline{)450} \quad . \quad 2\overline{)175} \qquad 7\overline{)3486}$$

Key: **1.** 20 children. **2.** 27 children. **3.** 25 pictures. **4.** 90, 87 R1¢, 498. **5.** 98, 75, 283. **6.** 65, 50, 314 R1¢. **7.** 97, 72, 148. **8.** 137, 48, 238. **9.** 146, 55 R5¢, 139 R3¢. **10.** 62 R4¢, 26 R5¢, 145. **11.** 66 R2¢, 62, 379.

Page 222

Aim: To provide ample review of multiplication and division

Key: **1.** 1467, 1644, 3008, 3283. **2.** 1635, 1533, 1462, 5551. **3.** 5520, 1232, 3136, 1722. **4.** 1686, 4131, 988, 6300. **5.** 2429, 1400, 826, 3154. **6.** 900 eggs. **7.** 184, 59, 38, 93 R3. **8.** 83, 171 R1, 162, 68. **9.** 114, 134 R3, 56 R1, 189. **10.** 97 R1, 47, 96, 79. **11.** 325, 96 R1, 125, 85. **12.** 880 yd. **13.** 129, 72, 1863, 55. **14.** 46, 1028, 35 R5, 112. **15.** 216, 291, 25, 75. **16.** 43, 87 R3, 104, 3450. **17.** 33, 100, 65 R3, 145. **18.** 187, 3478, 1386, 39.

Page 223

Aim: To present some problems without numbers

Suggestion: See the suggestions for teaching page 62.

Key: **1.** Add; subtract. **2.** Multiply. **3.** Subtract. **4.** Subtract. **5.** Divide; subtract. **6.** Multiply. **7.** Add.

Page 224

Aims: To review specialized vocabulary words; to extend the teaching of multiplication

Suggestions: The words found in ex. 1–5 were placed on the large class vocabulary chart when they were first introduced to the pupils. Other words on this chart may also be reviewed at this time by referring to the chart. The new learning on this page deals with multiplying dollars and cents by 10, 20, 30, and so on. The offset method is illustrated. If some pupils find difficulty in mastering this short-cut, refer to the suggestions for teaching page 204. The alternate method shown at that time may be more understandable to the slower pupil. If so, encourage him to use it.

Key: **1.** 87. **2.** 37. **3.** 36,240; 37,146. **4.** 37,146. **5.** 975. **7.** $75.00, $276.80, $150.00. **8.** $541.80, $212.50, $382.90. **9.** $165.20, $59.80, $137.40.

Page 225

Aim: To extend work in 2-figure multipliers to larger numbers

Suggestions: No new understandings or skills are required to accomplish this work. Urge the use of a comma in pointing off the final product. Examples involving dollars and cents should be checked for the proper placement of the decimal point in the answer. Not all pupils should be required to complete all the examples on this page. The slower pupil will not have enough time, and the advanced pupil should be excused from the drudgery of doing examples after he has demonstrated a good understanding of the work.

Workbook Reference: Arithmetic Workshop, Book 4, page 94

Key: **2.** 12,728, 15,600, 33,534, 22,940, $120.40, $314.94. **3.** 6699, 53,751, 19,600, 47,726, $135.05, $722.50. **4.** 45,172, 15,931, 15,312, 27,328, $193.68, $213.85. **5.** 5915, 17,115, 7315, 31,325, 26,110, 12,950; 7943, 22,983, 9823, 42,065, 35,062, 17,390; 15,548, 44,988, 19,228, 82,340, 68,632, 34,040; 11,492, 33,252, 14,212, 60,860, 50,728, 25,160. **6.** 18,620, 21,595, 12,740, 7945, 16,030, 22,085; 25,004, 28,999, 17,108, 10,669, 21,526, 29,657; 48,944, 56,764, 33,488, 20,884, 42,136, 58,052; 36,176, 41,956, 24,752, 15,436, 31,144, 42,908. **7.** 26,390, 32,725, 6545, 22,330, 17,920, 7140; 35,438, 43,945, 8789, 29,986, 24,064, 9588; 69,368, 86,020, 17,204, 58,696, 47,104, 18,768; 51,272, 63,580, 12,716, 43,384, 34,816, 13,872.

Pages 226–227

Aim: To show how to estimate answers to word problems and examples

Suggestions: One of the most important study skills in arithmetic is the ability to estimate an answer before actually working the word problem. This skill gives the pupil an excellent check on the reasonableness of his calculated answer. For instance, point out that if he buys 4 yards of ribbon at 24¢ a yard, he knows that it will cost around $1.00. If, however, in his computation of this example he gives an answer of $9.60, he realizes that his computed answer was unreasonable and immediately sets about to check his work. Many pupils have already become skillful at mental arithmetic; therefore, to encourage them to use this skill prior to actual pencil-and-paper work is an easy task. Above all, be sure that the pupil realizes that *estimation is a mental process* used prior to the actual computation by means of pencil and paper. *American Arithmetic, Grade 4* begins formal instruction in estimating with word problems. Notice that all such problems deal with dollar-and-cent situations. Ex. 6 and 7 act as a transition between problem situations and examples involving numbers only, while page 227 is devoted entirely to examples involving the four fundamental operations. Rules of estimation are quite simple and are based entirely on the tens nature of our number system. The plan is to round off to the nearest ten, hundred, or thousand. For instance, in ex. 9:

8 × 69 will round off to 8 × 70
4 × 29 will round off to 4 × 30
2 × 89 will round off to 2 × 90

In ex. 19 and 20, division examples are handled in the same way:

\$3.98 ÷ 4 will round off to \$4.00 ÷ 4
199 ÷ 4 will round off to 200 ÷ 4

Addition and subtraction examples are rounded off also, as in ex. 13:

396 + 602 + 197 will round off to 400 + 600 + 200
397 + 604 + 102 will round off to 400 + 600 + 100

and in ex. 16:

398 − 102 will round off to 400 − 100
602 − 498 will round off to 600 − 500
700 − 395 will round off to 700 − 400
800 − 203 will round off to 800 − 200

Urge the pupils to take every advantage of this new learning and continue to raise questions about how to estimate certain answers.

Workbook Reference: Arithmetic Workshop, Book 4, page 96

Key: Page 226 **2.** \$3 change; \$2. **3.** \$1.20; \$1.80. **4.** \$14; \$12; \$3.20. **5.** 3 tickets; 5 tickets; 7 tickets. **6.** 900. **7.** 50.

Page 227 **8.** Estimated, \$8.00; exact, 4 × \$1.95 each = \$7.80; more; because \$2.00 is *more* than \$1.95. (In answers to ex. 9–20, estimate is given first, followed by exact answer.) **9.** 560, 552; 120, 116; 180, 178; 200, 209. **10.** 270, 264; 300, 306; 450, 441; 2500, 2450. **11.** 250, 245; 400, 384; 700, 686; 800, 779. **12.** \$8.00, \$7.91. **13.** 1200, 1195; 1100, 1103. **14.** 900, 907; 1000, 997. **15.** \$2.00, \$2.09. **16.** 300, 296; 100, 104; 300, 305; 600, 597. **17.** 100, 112; 400, 396; 700, 702; 100, 104. **18.** 10 balloons. **19.** \$1.00, \$.99 R2¢; 50, 49 R3; 30, 29 R4; 20, 19 R7. **20.** \$.60, \$.60 R2¢; 100, 100 R2; 300, 299 R1; 300, 298 R1.

Page 228

Aim: To reteach the relative size of fractions

Suggestions: This work continues the readiness program for fractions introduced in Grade 3. Pupils are given an opportunity to discover that in fractions, the larger the denominator when the numerator is 1, the smaller the fraction. Be sure to provide ample opportunity for visualizing the work on this page. Circles and squared pieces of paper, which may be colored, help the pupils find that as the circles or squares are divided into smaller and smaller parts, the denominator of the fractional part becomes larger and larger. Ex. 4 gives an opportunity for clear thinking — the size of a unit fraction depends not only upon the size of the denominator but also upon the size of the object to which the fraction refers.

Workbook Reference: Arithmetic Workshop, Book 4, page 98

Key: **1.** $\frac{1}{6}$ of pie A; $\frac{1}{4}$ of pie B; smaller; smaller. **2.** $\frac{1}{2}$ of pie A; $\frac{3}{6}$; $\frac{1}{2}$. **3.** $\frac{1}{2}$ of pie B; $\frac{2}{4}$; $\frac{1}{2}$. **4.** $\frac{1}{4}$; $\frac{1}{4}$; no; pieces in cake D are bigger than those in cake C. **5.** $\frac{3}{4}$. **6.** 8. **7.** 6. **8.** 4. **9.** 2.

Page 229

Aim: To provide pupils with two rapid review tests

Suggestions: Some teachers allow the entire class to do ex. 7–16 first and correct the papers. All pupils who score highly may omit the work at the top of the page. Those who need further work may disregard the score they received on the first test and work ex. 1–6 as the new test. The new score is regarded as the score on this page.

Key: **1.** 10,184, 4363, 444, 7020, 25,746. **2.** 624 R2, 183, 937, 597. **3.** 954, 1855, 17,008, 4717, 7326. **4.** 1264, 1472. **5.** \$23.88, \$20.00, 75. **6.** 747, 26,175, 62. **7.** \$20.17. **8.** 3496. **9.** \$38.64. **10.** \$1.45. **11.** \$4.63 R1¢. **12.** 105. **13.** \$5.71 R3¢. **14.** 8385. **15.** 227. **16.** 248.

Page 230

Aim: To present two-step problems

Suggestions: Before the class begins work on this page, remind them of the importance of estimating an answer. In discussing ex. 1, pupils will suggest that \$.09 can be rounded off to \$.10 and that \$.10 and \$.35 make \$.45. It is then a simple matter mentally to subtract \$.45 from \$.75 *so that the answer must be about \$.30.* Also the pupils will see that the words "have left" denote subtraction.

Key: **1.** \$.09 + \$.35 = \$.44. \$.75 − \$.44 = \$.31. **2.** 6 × \$.25 = \$1.50. \$1.25 + \$1.50 = \$2.75. **3.** 15 + 33 = 48. 48 − 25 = 23 (box tops). **4.** \$4.95 + \$3.79 + \$1.10 = \$9.84. \$9.84 ÷ 3 = \$3.28. **5.** \$.75 + \$.45 = \$1.20. 3 × \$.45 = \$1.35. \$1.35 − \$1.20 = \$.15. **6.** \$.18 + \$.45 = \$.63. \$.63 ÷ \$.07 = 9 (cards). **7.** 35 + 39 = 74. 74 × \$.25 = \$18.50. **8.** 3 × \$3.98 = \$11.94. \$13.50 − \$11.94 = \$1.56.

Page 231

Aim: To review making change

Suggestions: If some pupils wish to use play money to find the correct answer to the first 5 problems, allow them to do so. In ex. 4, be sure that pupils use the accepted method of making change by saying, "If I spend 53¢, the store clerk will say 53, 55, 65, 75, \$1.00."

Key: **1.** \$.92 ÷ 2 = \$.46. \$.50 − \$.46 = \$.04. **2.** \$.53 + \$.29 + \$.56 = \$1.38. \$2.00 − \$1.38 = \$.62. **4.** 53, 55, 65, 75, \$1.00; 19, 20, 25, 50, \$1.00; 81, 85, 90, \$1.00; 28, 30, 40, 50, \$1.00; 15, 25, 50, \$1.00; 27, 30, 40, 50, \$1.00; 36, 40, 50, \$1.00. **5.** 4 × \$.15 = \$.60. 7 × \$.05 = \$.35; no; 1 nickel, 1 dime, 1 quarter. **6.** Yes. **7.** No. **8.** Yes. **9.** No. **10.** Yes. **11.** No. **12.** Yes. **13.** 30, 40, 50, \$1.00; 1.50, 2, 3, 4, \$5; 1.40, 1.50, \$2; 2.50, \$3; 4.60, 4.65, 4.75, \$5; 1.30, 1.40, 1.50, \$2; 60, 65, 75, \$1.00. **14.** \$4.00. **15.** \$1.00.

Page 232

Aim: To present an oral review

Suggestions: The work on this page can be completed mentally by all pupils. Be sure that they do not use pencil and paper. Insist that all computation be done mentally. If they have difficulty with ex. 1–10, permit them to refer to a measurement chart for the correct equivalents.

Key: **1.** 12. **2.** 9. **3.** 30. **4.** 14. **5.** 5280. **6.** 10. **7.** 5. **8.** 12. **9.** 24. **10.** 1760. **11.** 10 × 9¢ = 90¢. **12.** \$1.00. **13.** 43, 54, 61. **14.** 71, 78, 28. **15.** 34, 31, 66. **16.** 34, 56, 99, 79, 95, 129, 172, 53. **17.** 14, 10, 71, 15, 35, 27, 8, 7. **18.** 30, 16, 29, 14, 22, 15. **19.** 24, 51, 36, 89, 82, 45, 70, 63; 26, 53, 38, 91, 84, 47, 72, 65; 25, 52, 37, 90, 83, 46, 71, 64. **20.** 21, 35, 63, 0, 28, 49, 14, 42, 56; 27, 45, 81, 0, 36, 63, 18, 54, 72; 24, 40, 72, 0, 32, 56, 16, 48, 64.

Page 233

Aim: To present further review in basic skills

Suggestion: Ex. 1–5 are to be completed orally by the class, and most pupils should be able to give the answers to ex. 6 also.

Key: **1.** 3, 1, 16, 4, 5. **2.** 40, 16, 21, 9, 21. **3.** 12, 32, 13, 23, 7. **4.** 56, 8, 4, 9, 9. **5.** 17, 81, 16, 9, 8. **6.** 40, 70, 120, 410, 320, 200, 310, 240; 80, 140, 240, 820, 640, 400, 620, 480. **7.** 2630, 755, 2488, 2508, 1979. **8.** 1847, 5928, 2732, 420, 5049. **9.** 356, 437, 859, 789, 765. **10.** 896 R4, 635, 312, 467, 487. **11.** 627 R2, 829, 965 R3, 494 R7, 732. **12.** 2076, 2042. **13.** 1361, 2578. **14.** 2030, 2178.

Pages 234–235

Aim: To present problems related to trips

Suggestions: Pupils have already had numerous opportunities to study bus, train, and plane timetables. Now summer is approaching, and many families will be planning trips. The skills used in solving these problems are many: (1) calculating mileage; (2) figuring elapsed time; (3) associating speed with time; (4) figuring differences in mileage.

Key: Page 234 **1.** 2012 mi. **2.** 1 hr. 8 min. **3.** More. **4.** 61 people. **5.** 2 × \$3.37 = \$6.74. \$10.00 − \$6.74 = \$3.26.

Page 235 **6.** 52 in all. **7.** 273 mi. **8.** 954 mi.

Page 236

Aim: To review the major aims of Chapter 6

Suggestion: This page reviews seven of the eleven aims listed at the beginning of Chapter 6, as follows:

Chapter Review	*Aim Number*
Ex. 1 and 7	11
Ex. 2	10
Ex. 3, 5, 6	1
Ex. 4	6
Ex. 8–11	2, 3, 9
Ex. 12–16	1

The diagnostic test on page 238 reviews aims 4 and 5, and the problem test on page 237 tests aims 7 and 8.

Key: **1.** Jan., Feb., Aug., Sept., Oct., Nov., Dec. **2.** XIX, XXX, XIV, XXVI, XVII, XXIX. **3.** $\frac{1}{2}$ doz. **4.** \$16.00, \$15.60. **5.** How much did she receive for the cards? 50 × 5¢ = 250¢ or \$2.50. \$2.50 – \$1.98 = \$.52. **6.** \$2.39, \$2.40, \$2.50, \$3.00. **7.** 1492 and 1956. **8.** 5481, 28,858, 184. **9.** 4416, 30,375, 111 R1¢. **10.** 5850, 34,225, 263. **11.** 1160, 25,928, 475. **12.** 318, 166. **13.** 200, 327. **14.** 288, 366. **15.** 263, 27. **16.** 262, 145.

Page 237

Aim: To present Problem Test 6

Suggestion: Aims 7 and 8 are reviewed by the problems on this page.

Key: **1.** \$14.25. **2.** \$13.08. **3.** 132 cupcakes. **4.** \$2.50 ÷ 2 = \$1.25. \$1.25 + \$.75 = \$2.00. **5.** \$60.00; 30 × \$1.95 = \$58.50. **6.** \$1.49 + \$.75 = \$2.24; \$5.00 – \$2.24 = \$2.76. \$2.24, \$2.25, \$2.50, \$3.00, \$4.00, \$5.00. **7.** \$2.50 + \$1.06 = \$3.56. \$3.56 ÷ 4 = \$.89. **8.** 554 papers. **9.** 1282 people. **10.** 6 × 75 stamps = 450 stamps. 450 stamps ÷ 2 = 225 stamps.

Page 238

Aim: To provide a diagnostic test with practice page references

Key: **1.** 170, 213, 258, 283, 307. **2.** 1923, 2497, 2076, 2785, 1821. **3.** 1110, 2520, 7520, 1120, 3900. **4.** 7068, 2745, 3182, 6675, 2862. **5.** 9222, 15,254, 8928, 50,240, 9348. **6.** 62, 725. **7.** 124, 836 R4¢. **8.** \$1.74, \$5.84. **9.** \$.49 R4¢, \$3.96.

Chapter 7

Aims of Chapter 7. The major aims of Chapter 7 are to:

1. Review the basic understandings and skills taught in previous chapters.
2. Teach an understanding of the word *average* as it refers to arithmetic.
3. Teach the recognition of the name and shape of 5 geometric figures — *square, circle, triangle, rectangle,* and *right angle.*
4. Introduce pupils to the mysteries of the magic square.
5. Teach the multiplication facts of the 12's.
6. Extend the measures of weight to include the *ton.*
7. Teach zeros in the quotient.

Pages 239–241

Aim: To acquaint pupils with the meaning and calculation of *average*

Suggestions: Use the closed-book approach to this lesson. Place the word *average* on the class vocabulary chart. Relate the word to its many uses in daily living of pupils, such as (1) average allowance; (2) average amount of practice time on a musical instrument; (3) average rainfall. Then relate the word to schoolwork, such as (1) average mark in a subject; (2) average on a series of tests; (3) average attendance in the class for the past week. Place on the bulletin board some newspaper or magazine cutouts which deal with the word *average.* Be careful, however, not to post news releases which use *average* in a different sense. You should be alert to the fact that the word *average* can mean:

1. *The arithmetic mean.* This is the interpretation of *average* used on these pages. The arithmetic mean is computed by adding all the numbers and dividing by the number of addends or numbers added.

2. *The median.* This average is used in computing pupil grades on standardized achievement and intelligence tests and is computed by finding the middle grade in a series of test scores. This usage of *average* is common, especially in school situations. It *is not computed by addition and division.*

Although *none of the information above is for pupil instruction,* teachers should understand that there are different ways to interpret the word *average.* Pupils should not be introduced *at this time* to more than one meaning of the word. After developing the word *average,* instruct the pupils to open their books to page 239. Ex. 1 explains what the new word *average* means, and ex. 2 develops the method of calculating an average. Have pupils restate the rule for finding the average before turning to page 240. After the problems on page 240 have been completed, encourage pupils to create more problems which arise frequently in their school or home experiences. This teaching will lead to the remaining problems found on page 241. After this lesson is completed, be sure to provide opportunities from time to time — especially when the end-of-year tests are given in a few weeks — for pupils to calculate their own averages. Also, you may allow the class to help you calculate net average attendance, net average membership, and so on when you close your register at the end of the school year.

Workbook Reference: Arithmetic Workshop, Book 4, pages 101, 103, and 115

Key: Page 240 **2.** 14 + 10 + 15 = 39 eggs. 39 ÷ 3 = 13 eggs. **3.** 7 + 5 + 5 + 6 + 7 = 30 (doz.). 30 doz. ÷ 5 = 6 doz. **4.** 25¢ + 45¢ + 30¢ + 50¢ + 20¢ = 170¢. 170¢ ÷ 5 = 34¢. **5.** 9 + 10 + 5 = 24 (books). 24 books ÷ 3 = 8 books. **6.** 8 + 11 + 8 = 27 (books). 27 books ÷ 3 = 9 books.

Page 241 **1.** No; 98 + 92 + 92 = 282. 282 ÷ 3 = 94. **2.** 88. **3.** 17 words. **4.** 40 min. **5.** $2.55. **6.** $38.84. **7.** John, 88; Sally, 89; Bill, 90; Jane, 88; Fred, 82. **8.** 36, 221, 235.

Pages 242–243

Aims: To review measures of weight; to extend teaching to include the *ton*

Suggestions: Page 242 develops the meaning of the word *ton*. Place this word on the class vocabulary chart. Have the pupils discuss items that are bought and weighed by the ton. Encourage them to estimate the weight in pounds and ounces of various objects in the classroom, and to guess the weight in tons of such things as an automobile. (An automobile usually weighs about 1½ tons.) Ex. 6 on page 243 as well as ex. 9–15 continue this important estimating activity. Ex. 7 can be extended to include numerous articles bought by children which involve a translation of pounds to ounces. Some of the boys in the class will enjoy reporting on the weight markings seen on the doors or sides of light trucks and railroad freight cars. All of these pound markings can be translated into tons. A discussion of net weight may develop.

Key: Page 242 **1.** 5 × 2000 pounds = 10,000 pounds. **2.** 40 × 55 pounds = 2200 pounds; yes.

Page 243 **6.** Hay, ton; chicken, pound; hen's egg, ounce; coal, ton; letter, ounce; tiny turtle, ounce; sugar, pound; big fish, pound; truck with sand, ton. **7.** 16 oz. ÷ 2 oz. = 8 (bars). **8.** 2000 lb. ÷ 4 = 500 lb. **9.** Ounces. **10.** Tons. **11.** Pounds. **12.** Tons. **13.** Ounces. **14.** Pounds. **15.** Ounces. **16.** 48, 4000, 4. **17.** 8, 1000, 500.

Page 244

Aim: To review fundamental skills, especially in multiplication and division

Suggestion: Place special emphasis on ex. 6–11, which deal with difficult multiplication examples and 1-figure divisor examples in division.

Key: **1.** 1147, 1662. **2.** 2139, 2000. **3.** 1676, 2288. **4.** 1309, 1962, 2783, 1785, 2356. **5.** 3 R1, 9 R3, 5 R1, 7 R4, 8 R4, 7 R1, 9 R4; 2 R5, 8 R1, 4 R3, 6 R4, 7 R3, 6 R1, 8 R2; 2 R3, 7 R1, 3 R7, 5 R6, 6 R4, 5 R3, 7 R2; 2 R1, 6 R3, 3 R4, 5 R1, 5 R7, 4 R7, 6 R4. **6.** 5427, 1715, 8827, 6636, 23,180, 8322. **7.** 736, 1044, 6348, 22,092, 12,852, 37,920. **8.** 300, 600, 900, 1650, 3750, 4050, 2450. **9.** 214 R4, 457, 574, 692, 368 R1. **10.** 761, 683 R2, 324 R1, 775, 569 R3. **11.** 487, 933 R2, 321 R5, 489, 693 R5.

Page 245

Aim: To teach multiplication of large numbers, including dollars and cents, by 1-figure numbers

Suggestions: Many of the examples on this page involve triple carrying. The teacher should be alert for errors in addition since almost as many addition facts as multiplication facts are involved, and almost every addition fact involves adding by endings with bridging. As it has been some time since pupils were given a formal review of adding by endings, some errors may be readily traced to that process step.

Key: **2.** 7 × \$14.75 = \$103.25; 9 × \$16.25 = \$146.25. **3.** 53,704, 7425, 16,425, \$300.00, \$75.30. **4.** 24,426, 11,830, 45,870, \$196.00, \$152.00. **5.** 33,876, 10,356, 14,316, \$57.18, \$320.81. **6.** 31,680; 21,120; 42,240; 47,520.

Pages 246–247

Aim: To present five geometric figures and teach the name of each

Suggestions: Place the following words on the class vocabulary chart: *circle, square, rectangle, triangle, right angle.* As each word is placed on the vocabulary chart, have a pupil draw the corresponding figure on the board. Then have various pupils go to the board, point to the figure, and give its name. Do not let pupils write the name of the figure beneath it, but insist that they become familiar with the terms. Some teachers may want to construct flash cards (about 8″ × 12″) with the picture of the geometric figure on one side and its name on the other. Such cards might be used to provide more practice in recognizing the figures. The circle and the square will be easily learned, but *rectangle* and *triangle* may need more development and practice. Now follow the suggestions on page 246. Many teachers will correlate these pages with an art lesson involving scissor-and-paste techniques. A scrapbook of geometric figures may be the objective. Pupils should approach this lesson from an appreciation point of view and be encouraged to use their eyes on their way to and from school in search of things which resemble a circle, a square, and so on. These discoveries may become a part of the scrapbook. Others will leaf through magazines and newspapers for pictures of rectangles and other figures and bring them to school for the scrapbook.

Workbook Reference: Arithmetic Workshop, Book 4, page 102

Key: Page 246 **3.** 4 right angles. **4.** 4 right angles. **5.** Yes. **6.** No; opposite sides. **8.** Rectangle; two. **9.** Two.

Page 247 **2.** The angle opposite the cut edge. **3.** Triangles A and D.

Page 248

Aim: To develop further the skill of mental estimation

Suggestions: The secret of mental estimation is the ability to round off numbers to *tens, hundreds, thousands.* This process is using the *tens nature of our number system.* In ex. 1 the pupils may be reminded that:

201 + 596 will round off to 200 + 600
798 ÷ 4 will round off to 800 ÷ 4
7 × 19 will round off to 7 × 20

Ex. 5–12 provide fine estimation practice as they all deal with dollars and cents. Such exercises will become an important part of daily living.

Workbook Reference: Arithmetic Workshop, Book 4, pages 104 and 105

Key: (Ex. 1–4 and 13–15, estimate first, followed by exact answer.) **1.** 800, 797; 200, 199 R2; 140, 133. **2.** 300, 308; 2000, 2015; 360, 369. **3.** 300, 307; 40, 39 R5; 480, 468. **4.** 900, 899; 100, 97; 300, 310. **5.** $8. **6.** $2. **7.** $6. **8.** $.25. **9.** $9. **10.** $4. **11.** $35. **12.** $.30. **13.** $40, $39.90. **14.** $5, $4.94. **15.** $2, $2.05.

Page 249

Aim: To review difficult multiplication and division problems

Suggestions: Pupils who have demonstrated adequate mastery of these skills may be excused from this work. They will enjoy working some problems, puzzles, and playing games. Teachers are challenged to change periodically the materials in arithmetic available to pupils so that the more able pupils will continue to improve and enrich their basic understandings of the tens nature of our number system and the beauties of mathematics in general.

Workbook Reference: Arithmetic Workshop, Book 4, page 106

Key: **1.** 52 × $1.75 = $91.00. **2.** 450 ÷ 6 = 75 (packages). **3.** 36 × 79 = 2844. **4.** 6 × 638 = 3828; 59 × $1.48 = $87.32; 49 × 73 = 3577. **5.** 3228 ÷ 6 = 538. **6.** 423 ÷ 9 = 47; 2539 ÷ 8 = 317 R3; 2605 ÷ 5 = 521. **7.** 14,715, 6175, $88.48. **8.** 15,386, 5548, $74.24. **9.** 51,822, 2813, $87.32. **10.** 32,600, 5576, $102.00. **11.** 15,856, 1798, $198.37. **12.** 13,900, 5238, $164.15. **13.** 75, 845, 848 R3. **14.** 216 R1, 182, 523 R1. **15.** 236, 746, 430. **16.** 125 R3, 932, 456. **17.** 133, 845, 716 R1. **18.** 79, 834, 697.

Pages 250–251

Aim: To present word problems developed around a nature-study unit

Suggestions: *Arithmetic is all around us.* Few pupils realize how many ways arithmetic helps us to understand more fully the world in which we live. The problems on these pages have been developed from scientific research and suggest the constant use intelligent people make of arithmetic. There are many related learnings on these pages, such as:

1. The wonderful way in which nature provides a job for every living creature
2. The number of flies a bird will eat in a day
3. The speed at which a bird can fly
4. The great age of some birds as compared with human beings

The final problem on page 251 hints at a most fascinating class project dealing with nature study. This project is quite possible in most school locations as spring has come, and birds are more active in almost every part of our country.

Key: Page 250 **3.** 3 × 250 worm eggs = 750 worm eggs. **4.** 25 × 750 worm eggs = 18,750 worm eggs. **5.** 4 × 4 ft. = 16 ft. 16 × 12 in. = 192 in. 192 ÷ 6 = 32 (worms).

Page 251 **6.** 7 × 750 flies = 5250 flies. **7.** 8 × 17 mi. = 136 mi.; 204 mi. **8.** 8 × 50 mi. = 400 mi.; 600 mi. **9.** 2 × 5280 ft. = 10,560 ft. **10.** 100 yr. − 12 yr. = 88 yr.; yes. **11.** 8 × 12 = 96; yes.

Page 252

Aim: To provide an oral review

Key: **1.** About 60¢. **2.** About 80¢. **3.** About 100 stamps. **4.** 81, 37, 52, 86, 30, 63, 98, 54; 83, 39, 54, 88, 32, 65, 100, 56; 85, 41, 56, 90, 34, 67, 102, 58. **5.** 69, 64, 40, 22, 68, 45, 91, 33; 71, 66, 42, 24, 70, 47, 93, 35; 73, 68, 44, 26, 72, 49, 95, 37. **6.** 8, 8, 8, 10, 5, 6 R1. **7.** 7, 8, 21, 11, 10, 8 R1. **8.** 8, 18. **9.** 42, 4. **10.** 27, 12. **11.** 3, 3. **12.** 150, 8, 4, 21. **13.** 49, 7, 6, 20. **14.** 32, 9, 9, 21.

Page 253

Aim: To introduce pupils to the mysteries of the *magic square*

Suggestions: This activity is purely recreational in nature. Magic squares have provided thousands of hours of pleasure to scholars and may prove quite intriguing to the better arithmetic pupils in your class. A three-by-three magic square is relatively easy to solve; for the more precocious pupil suggest a four-by-four magic square, which will occupy him for some time.

Workbook Reference: Arithmetic Workshop, Book 4, page 95

Key: **1.** 15. **2.** 15. **3.** All sums are alike. **4.** All are magic squares, with the following sums: top row, 18; 39; 18; bottom row, 36; 60; 99.

Page 254

Aim: To review averages, multiplication, and division

Key: **1.** \$.50 + \$.75 + \$.60 + \$.80 + \$.60 + \$1.25 = \$4.50. \$4.50 ÷ 6 = \$.75. **2.** \$.90 + \$1.00 + \$.75 + \$.80 + \$.75 = \$4.20. \$4.20 ÷ 5 = \$.84. **3.** 31. **4.** 17. **5.** 40. **6.** 57. **7.** 119. **8.** 208. **9.** 337. **10.** 499. **11.** 4698; 6090; 15,660; 8004; 14,268; 8874. **12.** 21,560; 40,964; 12,397; 35,035; 10,241; 46,893. **13.** 4862; 15,444; 26,026; 9152; 19,448; 9724. **14.** 582; 436 R2; 194; 291; 349 R1; 249 R3. **15.** 328; 524 R4; 874 R2; 374 R6; 291 R5; 656. **16.** 281 R2; 211; 337 R3; 422; 844; 241 R1. **17.** 280; 360; 315; 504; 840; 630.

Page 255

Aim: To teach the multiplication facts of the 12's

Suggestions: The question of teaching the multiplication facts for the 12's is not one upon which all teachers are agreed. Some argue that it is unnecessary to teach the 12's facts, which is, of course, true. Others argue that while these facts are not absolutely necessary in memorized form, it is convenient to know them since multiples of 12 frequently occur in practical exercises. Since there are 12 inches to the foot, 12 articles in the dozen, 12 hours in the half-day, and 12 months in the year, a knowledge of the multiples of 12 may prove valuable. Furthermore, in long division with 2-figure divisors, which the pupils will study in Grade 5, it is desirable to know the multiples of 12 when the divisor 12 is used. If you have a class of average ability, the authors recommend that you teach the 12's. On the other hand, if the class is below average, omit the 12's and devote the time to more important topics. Stated differently, pupils who have a facility at mental arithmetic will profit from learning the 12's as their primary use is in mental estimation.

Key: **3.** $6 \times 10 = 60$, $6 \times 2 = 12$, $60 + 12 = 72$; $8 \times 10 = 80$, $8 \times 2 = 16$, $80 + 16 = 96$. **4.** 5×12 eggs $= 60$ eggs; 96 eggs; 36 eggs; 84 eggs. **5.** 4×12 in. $= 48$ in.; 24 in.; 72 in.; 108 in. **6.** 4×12 in. $= 48$ in. **7.** 4×12 in. $= 48$ in. 48 in. $+ 2$ in. $= 50$ in. **8.** Bob, 56 in.; Fred, 53 in.; Mary, 46 in.; Bill, 45 in.; Dick, 49 in.; Jack, 47 in.; Jim, 54 in.; Joe, 43 in.; Alice, 35 in.

Page 256

Aim: To teach the use of zero in the middle of the quotient

Suggestions: This is not the first time that pupils have encountered the zero difficulty in the quotient. Stress place value and the fact that zero acts as a place holder. Avoid any mention of special rules to follow.

Workbook Reference: Arithmetic Workshop, Book 4, pages 107 and 108

Key: **2.** \$1.03. **3.** 406, 105, 307 R2, 708 R3, 205. **4.** 106, 204, 508, 705 R1, 906 R2. **5.** 209, 208 R1, 609 R1, 704, 306. **6.** 309 R1, 109, 407 R1, 809, 408. **7.** 106 R1, 102, 406, 903, 308. **8.** 309, 105 R4, 503, 904, 607.

Page 257

Aim: To provide an oral test in number meanings, fractional concepts, and measures

Suggestions: An oral test will be more helpful than a written test in diagnosing pupil difficulties. This page has been carefully developed — notice the excellence of topic coverage:

Number meanings and place value — 1, 4, 12, 13
Estimations of answers — 2, 3, 14
Calendar and clock — 10, 11, 16, 17, 20
Fraction concepts — 6, 9
Roman numerals — 7
Measures — 5, 8, 15, 19
Geometric figures — 18

Key: **1.** Yes. **2.** No. **3.** Yes. **4.** Yes. **5.** No. **6.** Yes. **7.** No. **8.** No. **9.** Yes. **10.** No. **11.** No. **12.** Yes. **13.** No. **14.** Yes. **15.** No. **16.** Yes. **17.** No. **18.** Yes. **19.** No. **20.** Yes.

Page 258

Aim: To review zeros in the quotient

Suggestions: This review provides additional practice of the skill stressed on page 256. That zeros cause difficulty until thoroughly understood is generally conceded. Notice the predominance of zeros in the computation of the examples in ex. 2. To shorten the work, pupils who thoroughly understand these examples may write a zero in the quotient and then immediately bring down the next figure from the dividend.

Key: **3.** 10 R2, 80 R5, 800 R2, 703, 650. **4.** 10 R6, 130, 420, 706, 600. **5.** 10 R2, 190, 500, 205, 420. **6.** 400 R3, 240, 280 R1, 450 R2, 420; 801, 480, 560 R1, 900 R2, 840; 480 R3, 288, 336 R1, 540 R2, 504; 267, 160, 186 R7, 300 R2, 280. **7.** 325, 290 R2, 390, 350 R5, 230; 650, 580 R2, 780, 701 R2, 460; 390, 348 R2, 468, 421, 276; 216 R6, 193 R5, 260, 233 R8, 153 R3.

Page 259

Aim: To provide an oral test on the basic addition, subtraction, multiplication, and division facts

Suggestions: The facts placed on this page were chosen at random from the 390 facts composing this entire group of basic facts. The more difficult facts were chosen for inclusion in this test. Pupils who do not score highly need more practice on these basic facts. Refer them to the review pages at the back of the book.

Key: **1.** 8, 5, 4, 7, 9, 5, 6. **2.** 8, 7, 8, 3, 6, 3, 9. **3.** 4, 9, 5, 7, 4, 7, 8. **4.** 5, 9, 8, 9, 8, 6, 9. **5.** 63, 36, 28, 54, 27, 42, 25, 20, 14. **6.** 81, 56, 18, 45, 64, 40, 12, 35, 72. **7.** 24, 15, 48, 36, 16, 30, 49, 32, 63. **8.** 16, 12, 11, 15, 12, 13, 10, 9, 9; 18, 15, 9, 14, 16, 13, 7, 12, 17; 10, 8, 14, 13, 8, 11, 14, 12, 16. **9.** 6, 3, 9, 6, 6, 8, 6, 4, 7. **10.** 3, 3, 9, 8, 9, 6, 3, 9, 9.

Page 260

Aim: To present problems arising from a pet show

Suggestions: Many excellent teaching leads come from pets and their care. Just as readers are provided with stories on pets and poor spellers are directed to words dealing with pets, so pets can become a motivation for the study of arithmetic. The pupils can create many problems dealing with the costs of pets. These problems stress comparison by subtraction and division.

Key: **1.** 62 pets. **2.** 9 dogs. **3.** 24 fish − 6 fish = 18 fish. 18 fish ÷ 2 = 9 fish. **4.** \$50 − \$10 = \$40. **5.** 150 lb. − 2 lb. = 148 lb. **6.** 75 × 2 lb. = 150 lb.; yes. **7.** 36 ÷ 12 = 3 (times).

Page 261

Aim: To provide a comprehensive written review dealing with understandings and skills

Suggestions: The work on this page is planned to review many understandings and skills:

Our number system (place value, etc.)	3, 4
Roman numerals	9
Averages	11
Fractional measures	15–16
Addition of columns of numbers	1–2
Subtraction	5–8
Multiplication	10, 13
Division by 1-figure numbers	12, 14

Key: **1.** 15,855, 27,348. **2.** 10,582, 16,824. **3.** 9999; 10,000; 99,999; 999,999. **4.** 57,043; 5 ten-thousands, 7 thousands, 0 hundreds, 4 tens, 3 ones. **5.** 4725. **6.** 1748, 3862, 558. **7.** 2299, 2370, 589. **8.** 4818, 3779, 46. **9.** IX, XI, XIV, XVII, XIX, XXV, XXIX, XXX. **10.** 64 × 528 = 33,792; 50 × 794 = 39,700. **11.** 81 + 63 + 59 + 72 + 80 = 355. 355 ÷ 5 = 71. **12.** 6286 ÷ 7 = 898; 3542 ÷ 7 = 506. **13.** 8 × 2375 = 19,000; 9 × 2040 = 18,360. **14.** 2934 ÷ 3 = 978; 1900 ÷ 5 = 380; 8118 ÷ 9 = 902. **15.** 20, 660. **16.** 8, 880.

Page 262

Aim: To provide practice in solving word problems

Key: **1.** 5 × \$.30 = \$1.50. **2.** \$19.50 ÷ 2 = \$9.75. **3.** 8 + 11 + 9 + 7 + 10 = 45 eggs. 45 eggs ÷ 5 = 9 eggs. **4.** 15 × \$.25 = \$3.75; \$5.00 − \$3.75 = \$1.25. **5.** 2 × \$2.25 = \$4.50; \$11.00 + \$4.50 + \$1.19 = \$16.69. **6.** \$.39 + \$.85 + \$1.23 = \$2.47; \$3.00 − \$2.47 = \$.53. **7.** 270 children ÷ 6 = 45 children. **8.** 41 + 36 + 29 + 38 + 35 + 37 = 216 (children). **9.** 1350 mi. − 1136 mi. = 214 mi.

Page 263

Aim: To provide practice in mental arithmetic

Suggestion: This test is a continuation of the one found on page 257 and includes topics, such as averages, change making, and arithmetic vocabulary, not covered by the previous test.

Key: **1.** Yes. **2.** No. **3.** No. **4.** Yes. **5.** No. **6.** Yes. **7.** No. **8.** No. **9.** Yes. **10.** Yes. **11.** No. **12.** Yes. **13.** Yes. **14.** No. **15.** No. **16.** Yes. **17.** Yes. **18.** No. **19.** Yes.

Page 264

Aim: To provide problems based on travel experiences

Suggestions: Problems of a similar nature were presented on pages 234–235, but here the cost of traveling rather than the time involved is stressed. Ex. 3 lists accommodations for 3 people as costing $7.50 and $6.75 nightly. A good question to raise at this point is, "What would similar accommodations cost in this region during the tourist season?" Ex. 5 indicates that gasoline costs for this trip were less than 2¢ per mile. This may seem like a rather low figure. You may wish to compare gasoline costs in your area. Pupils will be quick to note that most automobiles average 15–17 miles to a gallon of gas; therefore, this trip might be more expensive than $23.55. An excellent activity for the more advanced pupils would be to approximate what gasoline and oil costs would be for a trip of this distance under local cost conditions. It also might lead to the conclusion that gasoline and oil *are not the only costs* involved in the operation of an automobile. This type of arithmetic problem solving is encountered daily by adults. Such word problems in *American Arithmetic, Grade 4* should be used, when possible, as a springboard to the problems of everyday living.

Key: **1.** 275 + 310 + 290 + 280 + 255 = 1410 (mi.). 1410 mi. ÷ 5 = 282 mi. **2.** 705 mi. **3.** $7.50 + $6.75 = $14.25. **4.** $8.75 + $4.75 + $8.00 + $5.25 + $4.00 = $30.75. $30.75 ÷ 5 = $6.15. **5.** $14.25 + $30.75 + $23.55 + $7.80 = $76.35. **6.** 1:15 P.M.

Page 265

Aim: To provide more review practice in multiplication

Suggestion: The more advanced pupils may omit ex. 1–9 and proceed directly to the test on ex. 10–17.

Key: **1.** 13,015, 832, 21,889. **2.** 65,065, 769 R1, 27,372. **3.** 12,350, 805, 11,202. **4.** 8748, 370 R1, 76,428. **5.** 25,620, 490 R5, 14,825. **6.** 37,760, 642 R1, 25,632. **7.** 28,840, 706, 14,652. **8.** 57,021, 584, 3177. **9.** 21,216, 497, 42,630. **10.** Average. **11.** Quotient. **12.** Circle. **13.** Right. **14.** Multiplication; division. **15.** Fractions. **16.** Dozen. **17.** Remainder.

Page 266

Aim: To provide a deeper understanding of geometric figures

Suggestions: This page extends the basic understandings first taught on pages 246–247. Some teachers will review for this work by using the flash cards developed for page 247. Ex. 2 suggests a humorous use of figures. Ex. 4 not only develops the circle concept but also reviews the reading of a clock.

Key: **1.** 3 circles; 4 squares; 5 rectangles; 4 triangles. **2.** 1 square; 2 circles; 5 triangles; 3 rectangles.

Page 267

Aim: To provide problems without numbers

Suggestion: This is the fifth page in *American Arithmetic, Grade 4* which provides practice in this skill. See the instructions for teaching page 62.

Key: **1.** Divide. **2.** Add; divide. **3.** Multiply. **4.** Subtract; multiply. **5.** Add. **6.** Subtract. **7.** Add; subtract. **8.** Multiply.

Page 268

Aim: To provide word problems for completion

Suggestions: At various intervals this Guide has suggested that pupils create their own word problems. The work on this page is a slight variation of this activity. Here the pupil will find all the facts of the problem-solving situation, and he is challenged to make up the question which is appropriate. Naturally, more than one question can be suggested, and therefore more than one answer is correct. You will find it interesting to note the pupils who use a variety of thought patterns in completing the word-problem situations and those who restrict their thinking to just one or two thought patterns.

Page 269

Aim: To provide practice

Suggestions: The work on this page varies considerably from the oral practice pages previously studied in this chapter. The problems emphasize adding by endings, subtracting by endings, multiplying by tens, and division by 2 and 4.

Key: **1.** 32¢. **2.** 10¢. **3.** 10 marbles. **4.** 23, 59, 97, 65, 76, 51, 92, 40; 25, 61, 99, 67, 78, 53, 94, 42; 26, 62, 100, 68, 79, 54, 95, 43; 28, 64, 102, 70, 81, 56, 97, 45. **5.** 81, 54, 32, 100, 94, 58, 73, 36; 83, 56, 34, 102, 96, 60, 75, 38; 84, 57, 35, 103, 97, 61, 76, 39; 86, 59, 37, 105, 99, 63, 78, 41. **6.** 70, 85, 31, 59, 14, 47, 36, 81; 66, 81, 27, 55, 10, 43, 32, 77; 65, 80, 26, 54, 9, 42, 31, 76. **7.** 33, 38, 18, 12, 84, 55, 90, 67; 29, 34, 14, 8, 80, 51, 86, 63; 28, 33, 13, 7, 79, 50, 85, 62. **8.** 40¢; 80¢; $1.00. **9.** 12 hr.; 12 hr. ÷ 4 = 3 hr. **10.** 28, 30, 40, 82, 64, 46, 48, 86; 140, 150, 200, 410, 320, 230, 240, 430; 280, 300, 400, 820, 640, 460, 480, 860. **11.** 44, 68, 24, 66, 88, 80, 26, 42; 220, 340, 120, 330, 440, 400, 130, 210; 440, 680, 240, 660, 880, 800, 260, 420. **12.** 12, 20, 14, 100, 241, 60, 201; 6, 10, 7, 50, 120 R2, 30, 100 R2. **13.** 40, 24, 22, 64, 122, 82, 104; 20, 12, 11, 32, 61, 41, 52.

Page 270

Aim: To present word problems dealing primarily in measures

Suggestions: At various times in Grade 4, pupils have been urged to estimate answers dealing with measures. This page will evaluate the extent to which they have understood this work. Before each problem is calculated, the pupil should ask himself certain pertinent questions. In problem 1, he might ask, "Is the answer more or less than 350?" "Is it twice as much or four times as much as 350?" Once the estimate is made, then the pupil computes to get the correct answer. Also be sure to stress the fact that all answers should be labeled.

Key: **1.** 4 × 350 = 1400 (qt.). **2.** 1520 ÷ 4 = 380 (qt.). **3.** 37 min. **4.** 24 × 75 lb. = 1800 lb.; more; 800 lb. **5.** 63 in. − 47 in. = 16 in. **6.** 150 cookies ÷ 6 cookies = 25 (packages). 25 × \$.23 = \$5.75. **7.** 9 in. + 8 in. = 17 in.; $\frac{1}{2}$ yd. **8.** 4 red; 3 black; 7 buttons.

Pages 271–273

Aim: To review the basic skills, fractions, and measures

Suggestions: The work on these three pages is a concentrated review of basic skills taught in Grades 3 and 4. The school year is drawing rapidly to a close, and these pages provide a fine way for teachers to evaluate achievement. Page 271 reviews addition and subtraction; page 272 reviews fraction understandings; and page 273 presents a general review with special emphasis on measures.

Workbook Reference: Arithmetic Workshop, Book 4, pages 112–114

Key: Page 271 **1.** 304, 2308. **2.** 259, 1967. **3.** 244, 2190. **4.** 286, 1493. **5.** \$183.98. **6.** 300. **7.** \$3.02. **8.** 95, 134, 138, 152, 111, 100. **9.** 689, 413, 521, 1000. **10.** 220, 577, 4913. **11.** 558, 545, 3643. **12.** 387, 835, 1127. **13.** 127, 499, 2796. **14.** 1088. **15.** 169; 34; 285. **16.** 4580. **17.** 402; 297. **18.** 197, 419, 255, 484, 248, 82; 376, 18, 333, 90, 364, 121.

Page 272 **1.** One half; one fourth; one sixth; one eighth. **2.** Pie A; pie D. **3.** 6; $\frac{6}{6}$. **4.** 2; $\frac{2}{2}$. **5.** 8; $\frac{8}{8}$. **6.** 4; $\frac{4}{4}$. **7.** (a) $\frac{3}{4}$ of a pie; (b) $\frac{1}{2}$ of a pie; (d) $\frac{1}{4}$ of a pie. **9.** $\frac{3}{4}$, $\frac{1}{4}$, $\frac{2}{2}$, $\frac{5}{6}$, $\frac{5}{8}$, $\frac{7}{8}$. **10.** $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, $\frac{1}{9}$.

Page 273 **1.** 323. **2.** 575. **3.** 1735. **4.** 19,308. **5.** 14,624. **6.** 21. **7.** 598. **8.** 504. **9.** 69. **10.** 2304. **11.** 555 R5. **12.** 24¢. **13.** 24,336. **14.** 180 sec. **15.** 4 oz. **16.** 48 ft. **17.** 21. **18.** VI, XIV, XXV, XXIX. **19.** \$8.25. **20.** \$12.00. **21.** 72 oranges. **22.** 45 stamps. **23.** \$2.16. **24.** 1000 lb. **25.** 78 yd.

Page 274

Aim: To review the major aims of Chapter 7

Suggestion: The work on this page reviews five of the seven aims listed at the beginning of Chapter 7, as follows:

Chapter Review	*Aim Number*
Ex. 1–3, 5–6	1 and 6
Ex. 4	3
Ex. 7–8	2
Ex. 9–10	1
Ex. 11–13	7

Key: **3.** pt., qt., gal., oz., lb., T., mi. **4.** Rectangle; circle; triangle; square. **5.** 2000 lb.; 500 lb. **6.** 48 rolls. **7.** 141. **8.** \$10.00. **9.** 52,304, 13,470, 12,777, \$215.40, \$678.78. **10.** 12,668, 49,896, 72,567, \$87.90, \$777.12. **11.** 705 R3, 320 R7, 427, 900, 604. **12.** 387 R1, 908, 765, 905, 500 R5. **13.** 890, 307 R4, 817, 400 R6, 370 R2.

Page 275

Aim: To present Problem Test 7

Key: **1.** 285 mi. + 325 mi. + 335 mi. = 945 mi. 945 mi. ÷ 3 = 315 mi. **2.** 12 × \$.19 = \$2.28. \$2.28 − \$2.00 = \$.28. **3.** 294 boys. **4.** 6 + 5 + 8 + 4 + 7 + 6 = 36 (doz.). 36 × \$.59 = \$21.24. **5.** 125 × \$.03 = \$3.75. \$5.00 − \$3.75 = \$1.25. **6.** \$359.70. **7.** 7 × 12 = 84 (paper plates). 84 − 9 = 75 (paper plates). **8.** \$3.09. **9.** \$3.50 + \$.89 + \$.15 = \$4.54. \$4.54 + \$1.08 = \$5.62. **10.** 25¢ + 30¢ + 10¢ = 65¢.

Page 276

Aim: To provide a diagnostic test with reference to practice pages

Key: **1.** 7743, 41,749, 36,855, 24,637. **2.** 43,470, 9160, 35,100, 16,500. **3.** 19,256, 13,028, 37,158, 52,326. **4.** 45, 318. **5.** 671, 542. **6.** 635, 948, 279, 375. **7.** 507, 802 R2, 306, 807 R1. **8.** 860, 500 R7, 970 R1, 700. **9.** 503, 308. **10.** 604, 602. **11.** 750, 500. **12.** 700, 910.

Chapter 8

Aims of Chapter 8. The major aims of Chapter 8 are to:

1. Review the calculation of *average* and provide further activity with measures.
2. Introduce the addition of like fractions.
3. Use the ruler to increase understanding of fractions.
4. Teach the finding of fractional parts with fractions having numerators larger than 1.
5. Teach dry measures of quart, peck, and bushel.
6. Provide end-of-year tests in all basic skill areas.

Page 277

Aim: To develop readiness in adding like fractions

Suggestions: The most common use of fractions in the home is found in the kitchen. The apt pupil will probably point out that the problems found on this page are not usually presented just as they are described. For instance, in ex. 2, the matter of how much sugar is needed is secondary to the fact that not all of the sugar needed is the same kind. Therefore, it will not be measured at the same time, or come from the same package. On the whole, fractions as used in the kitchen become a fraction-recognition situation rather than a fraction-computation situation. One of the important learnings from this page is that of comparing the amount of nuts used in the cake ($\frac{1}{3}$ cup) with the amount of brown sugar needed for cookies ($\frac{1}{2}$ cup). The $\frac{1}{2}$ cup is recognized as a greater quantity than the $\frac{1}{3}$ cup.

Key: **1.** $\frac{1}{4}$ lb. + $\frac{3}{4}$ lb. = 1 lb.; 4 fourths; 1. **2.** $\frac{1}{2}$ cup + $\frac{1}{2}$ cup = 1 cup; 1 cup; 1. **3.** $\frac{2}{3}$ cup + $\frac{1}{3}$ cup = 1 cup; $\frac{3}{3} = 1$.

Page 278

Aim: To extend the teaching of adding like fractions

Suggestions: This page extends the readiness program on the preceding page and provides an opportunity to use a flannelboard with fractional parts to illustrate the combining of like fractions into a whole (or nearly a whole). Notice that all adding of fractions is done horizontally. The use of the horizontal form allows the pupil to think in concrete terms concerning the addition of fractional parts and places no emphasis on a mechanical type of calculation, a skill reserved for Grade 5. All the suggested activity on this page deals with concrete objects, and teachers should make every effort to keep the work on an objective rather than an abstract basis. In ex. 8, pupils might enjoy cutting a circle into eighths and then naming the parts as they reassemble them.

Key: **1.** 2 equal pieces; yes; yes. **2.** Yes; yes. **4.** $\frac{3}{4}$; yes; yes; yes. **5.** $\frac{2}{6}$; 2 answers. **6.** $\frac{3}{6}$; 2 answers; $\frac{3}{6}$, $\frac{1}{2}$. **7.** $\frac{5}{6}$; $\frac{5}{6}$; $\frac{5}{6}$. **8.** One eighth; $\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$.

Page 279

Aim: To extend the teaching of fractions to abstract figures

Suggestions: All the work on this page is primarily abstract in nature. Although there are pictures of circles, most of the work is to be done with pencil and paper. Ex. 7–15 provide the pupil with an opportunity to write the sentences in figures. Notice that all fractional statements are made in horizontal form.

Key: **1.** 2; $\frac{2}{4}$. **2.** $\frac{3}{4}$; $\frac{3}{4}$. **3.** $\frac{4}{4}$, 1; $\frac{4}{4}$, 1. **4.** $\frac{3}{4}$, $\frac{3}{4}$; $\frac{2}{4}$, $\frac{2}{4}$; $\frac{1}{4}$, $\frac{1}{4}$. **5.** Yes; yes. **6.** Yes; yes; yes; yes. **7.** $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$. **8.** $\frac{3}{4} + \frac{1}{4} = \frac{4}{4}$. **9.** $\frac{3}{3} - \frac{1}{3} = \frac{2}{3}$. **10.** $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$. **11.** $\frac{1}{3} + \frac{2}{3} = \frac{3}{3}$ or 1. **12.** $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$. **13.** $\frac{4}{4} - \frac{2}{4} = \frac{1}{2}$. **14.** $\frac{2}{2} - \frac{1}{2} = \frac{1}{2}$. **15.** $\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$.

Pages 280–281

Aim: To extend the addition of fractions to sums greater than 1

Suggestions: Ex. 2 on page 280 begins the new work on these pages. Use objects, if you wish, to illustrate the problems. If pupils need concrete objects to complete the work in ex. 6–11 on page 280, allow their use. However, when the work on page 281 is started, urge the pupils to complete as many exercises as possible without resorting to the making or handling of objects. All the work on these initial pages of Chapter 8 prepares for fraction work in Grade 5. The main purpose of these lessons is to inform pupils that computation with fractions is possible and to show the existence of occasions calling for such work. No formal testing on these learnings will occur at this grade level.

Key: Page 280 **3.** 6 halves; $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 3$. **5.** $4\frac{1}{2}$ apples. **6.** Right; wrong. **7.** Right; right. **8.** Right; right. **9.** Wrong; right. **10.** Wrong; right. **11.** Right; wrong.

Page 281 **1.** Right, right, right. **2.** Right, wrong, right. **3.** Wrong, right, right. **4.** Right, right, right. **5.** Right, wrong, right. **6.** $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$ or $\frac{1}{2}$. **7.** $\frac{4}{4} - \frac{2}{4} = \frac{2}{4}$ or $\frac{1}{2}$. **8.** 1 whole pie and $\frac{3}{4}$ of another; 3 whole pies and $\frac{1}{4}$ of another. **9.** $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$ (hr.); yes. **10.** $\frac{4}{4} + 1 = 2$ (dollars).

Page 282

Aim: To use a ruler to increase understanding of fractions

Suggestions: The ruler is very useful in teaching fractions. In fact, if fractions are confined to halves, fourths, and eighths, much of the preliminary work in calculating with fractions can be accomplished with the help of a ruler. There is, however, a far more important reason for using a ruler at this point than to help in understanding fractions: to help pupils understand how to use a ruler. A common complaint of shop and home-economics teachers is that children do not know how to use a ruler. Certainly this is a good time to teach this skill. Summer will soon be here, and many possible uses of a ruler will present themselves during vacation months. This page is an extremely important one and demands more than casual attention.

Key: **1.** 2 in.; 3 in.; 4 in. **2.** $\frac{1}{8}$ in. **3.** 4; $\frac{2}{8}$; yes; $\frac{8}{8}$; yes. **4.** $\frac{2}{4}$; yes; $\frac{4}{8}$; yes; yes; yes. **5.** Yes; yes; yes.

Page 283

Aim: To teach how to add and subtract fractions representing eighths

Suggestions: Much of the work on this page can be computed by referring to the ruler used on the previous page. For instance, ex. 8–11 could be computed from a ruler. In ex. 8, the pupil could count off $\frac{1}{8}$, $\frac{1}{8}$, and $\frac{1}{8}$ and continue counting to the one-inch marking. Thus, his answer is 1. In similar fashion, he could find $\frac{7}{8}$, count back $\frac{4}{8}$, and get $\frac{3}{8}$. After some of this work, the advanced pupil will indicate the rule to follow in addition and subtraction of like fractions; namely, if the denominators are the same, add or subtract the numerators to get the answer.

Key: **1.** $\frac{1}{8}$; $\frac{2}{8}$; $\frac{3}{8}$; $\frac{5}{8}$; $\frac{7}{8}$. **2.** $\frac{8}{8}$. **3.** Yes; yes. **4.** $\frac{3}{8}$; $\frac{4}{8}$ or $\frac{1}{2}$. **5.** $\frac{6}{8}$; yes. **6.** $\frac{3}{4}$; yes. **7.** Yes. **8.** $\frac{8}{8}$, $\frac{3}{8}$, $\frac{2}{8}$. **9.** $\frac{7}{8}$, $\frac{3}{8}$, $\frac{5}{8}$. **10.** $\frac{6}{8}$, $\frac{5}{8}$, $\frac{5}{8}$. **11.** $\frac{7}{8}$, $\frac{7}{8}$, $\frac{5}{8}$.

Page 284

Aim: To provide further practice with fourths and eighths

Suggestions: You will notice that the textbook emphasizes related fractions. Fourths and eighths are related fractions. Halves, fourths, and eighths are related; halves, thirds, and sixths are related. However, halves, thirds, and fourths *are not related*. If slow pupils need help with this page, they should be permitted to use the ruler.

Key: **1.** Right. **2.** Right, wrong, right. **3.** Wrong, right, right. **4.** Wrong, right, wrong. **5.** Right, right, right. **6.** Wrong, right, right. **7.** Right, wrong, wrong. **8.** Right, right, right. **9.** Right, wrong, wrong. **10.** $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$ (yd.). **11.** $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$ (lb.). **12.** $\frac{4}{4} - \frac{1}{4} = \frac{3}{4}$ (lb.). **13.** $\frac{3}{8} + \frac{3}{8} = \frac{6}{8}$ (yd.). **14.** $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$ or $\frac{1}{2}$ (lb.).

Page 285

Aims: To reteach abbreviations of measures; to review some simple equivalents

Suggestions: Ex. 1–3 may be used for another purpose after the abbreviations are completed. You might ask which is larger — inch or yard? pound or ton? Also, if certain items in the classroom lend themselves readily to measurement, you might ask the pupils to *approximate or estimate* the measurement of such an item. Those who have difficulty with ex. 4–8 should be encouraged to review previous lessons on measures.

Key: **1.** In., lb., T., qt., doz., yd. **2.** Pt., gal., da., oz., sec., ft. **3.** Wk., min., mi., mo., hr., yr. **4.** 60, 15, 2. **5.** 2, 30, 24. **6.** 3, 2, 30. **7.** 28, 9, 2. **8.** 6, 5280, 6. **9.** 2 hr. 20 min. **10.** May 27. **11.** 176 ÷ 4 = 44 (qt.). 44 ÷ 4 = 11 (gal.). **12.** 90 in. + 54 in. = 144 in. 144 ÷ 36 = 4 (yd.). **13.** 3 da. + 31 da. + 31 da. + 5 da. = 70 da. 70 ÷ 7 = 10 (wk.).

Page 286

Aim: To review special arithmetic words

Suggestions: Ex. 1–8 test the pupils' understanding of common arithmetic words.

Call attention to the fact that the numbers in question are 36 and 6. The pupils are to make the required computation and place the answer on a piece of paper. Before beginning, they should number their papers 1–8. The oral section of this test stresses mental arithmetic. Some teachers will extend the practice exercises in ex. 11–12 by proposing more work of the same type.

Key: **1.** 42. **2.** 216. **3.** 21. **4.** 30. **5.** No. **6.** Yes. **7.** 6. **8.** 30. **9.** (See answers for those pages.) **10.** 60, 89, 35, 82, 43, 21, 54, 66; 62, 91, 37, 84, 45, 23, 56, 68; 63, 92, 38, 85, 46, 24, 57, 69. **11.** 62, 61, 39. **12.** 34, 39, 80.

Page 287

Aim: To review the four fundamental operations

Suggestions: Allow sufficient time for pupils to complete this page. Do not set a fixed time and collect papers. Encourage all class members to complete the work. Some teachers will keep an informal record of the time consumed by very slow pupils or by very rapid workers. In the latter case, if the work is not accurately completed, urge them to slow down. Observe those who work very slowly in an effort to determine whether faulty work habits are the underlying cause. In some instances, pupils will slow down only on certain types of examples. An observation of this work habit will yield valuable advice to the teacher in planning a remedial program for the summer. Use the remaining tests in this chapter for the purpose of diagnosing pupil difficulties and evaluating achievement.

Key: **1.** $110.97, $184.49, $200.00, $190.67, $195.43. **2.** $49.27, $37.66, $54.13, $9.53, $32.04. **3.** $158.00, $9.66, $77.25. **4.** $343.92, $59.13, $573.30. **5.** $8.35, $7.45, $6.16. **6.** $8.50, $4.47, $6.54 R3¢. **7.** 76. **8.** 838. **9.** 41,364, 2955, 1255, 3819, 20,832. **10.** 647, 340 R4, 726, 719, 907. **11.** 16,047, 2866. **12.** 14,630, 31,703, 6325.

Pages 288–289

Aim: To provide further practice in finding averages

Suggestions: The problems on page 288 deal with music lessons and practice time. Notice that the facts in these problems are quite realistic. For instance, in ex. 1 Sally practiced between 30 and 45 minutes daily, a very satisfactory length of time for a fourth-grade girl. In ex. 3 Andy practiced 150 minutes in 6 days. On page 289 the averages relate to mileage, temperature, weight, and so on; and lines 8–17 provide practice in finding averages of abstract numbers.

Key: Page 288 **1.** 38 min. **2.** 45 min. **3.** 150 min. ÷ 6 = 25 min. **4.** 5 hr. = 300 min. 300 min. ÷ 6 = 50 min.

Page 289 **1.** 1060 mi. ÷ 4 = 265 mi. **2.** 210 mi. ÷ 5 = 42 mi. **3.** $1.60 ÷ 5 = $.32. **4.** 49° + 51° + 45° + 55° + 59° + 50° + 48° = 357°. 357° ÷ 7 = 51°. **5.** 378 papers ÷ 6 = 63 papers. **6.** $9.00 ÷ 4 = $2.25. **7.** 60 lb. + 55 lb. + 57 lb. + 61 lb. + 57 lb. = 290 lb. 290 lb. ÷ 5 = 58 lb. **8.** 22. **9.** 39. **10.** 63. **11.** 20. **12.** 74. **13.** 31. **14.** $1.58. **15.** $.33. **16.** $.47. **17.** $.88.

Page 290

Aim: To provide word problems requiring questions and then solutions

Suggestions: Page 268 of the Guide develops suggestions for using this type of activity.

Page 291

Aim: To teach dry measures

Suggestions: In teaching dry measure, remember that there is a growing practice in many localities of selling by the pound things which were formerly sold by the dry quart or the peck. For example, in many localities string beans, tomatoes, and apples are now sold by the pound instead of by the dry quart or the peck. Ask the pupils to inquire about the practice in your locality and learn what fruits and vegetables are still sold by the peck and bushel.

Key: **4.** 4 × 8 qt. = 32 qt. **5.** 32 × \$.12 = \$3.84. \$3.84 − \$2.50 = \$1.34. **6.** 8 ÷ 2 = 4 (da.). 32 ÷ 2 = 16 (da.). **7.** 4, 8, 32. **8.** 8, 2, 24.

Page 292

Aim: To test basic understandings by means of a Yes-No test

Suggestions: *This is an oral test* covering a number of basic understandings taught in *American Arithmetic, Grade 4*. An analysis of this test reveals the following coverage:

Basic Understanding	*Ex. Number*
Units of time	1, 3, 12, 14, 17, 18
Rounding off numbers for estimating	2, 11, 13
Measures of length	4, 7, 20
Averages	5
Estimating answers	6, 8, 10
Geometric figures	9, 15
Roman numerals	16
Liquid measure	19

Key: **1.** No. **2.** Yes. **3.** Yes. **4.** No. **5.** Yes. **6.** Yes. **7.** Yes. **8.** No. **9.** Yes. **10.** No. **11.** Yes. **12.** No. **13.** Yes. **14.** Yes. **15.** No. **16.** No. **17.** Yes. **18.** No. **19.** Yes. **20.** No.

Page 293

Aim: To provide a written test on basic understandings

Suggestion: After the class has completed this test, provide more practice in writing numbers as required in ex. 1.

Key: **1.** (a) 9753, (b) 4900, (c) 6004. **2.** 706. **3.** 3900, 17,983, 11,800. **4.** 96. **5.** 65; 384. **6.** 14,670. **7.** \$3.00 estimated; \$2.95 exact. **9.** $\frac{2}{4}$ lb. or $\frac{1}{2}$ lb. **10.** 24 pieces. **11.** \$4.50. **12.** 8 boxes.

Pages 294–295

Aim: To teach the finding of a fractional part of a number when fractions with numerators larger than 1 are used

Suggestions: This work in finding the fractional part of a number has wide use in everyday life. In the previous work in finding fractional parts of numbers, the fractions have always been unit fractions like $\frac{1}{2}$ or $\frac{1}{4}$. The work is now extended to include fractions like $\frac{3}{4}$ and $\frac{2}{3}$. Ex. 1 on page 294 explains the method to be used. The pupil is encouraged to find $\frac{1}{4}$ of a dozen and then multiply by 3 as he is looking for $\frac{3}{4}$ of a dozen. Naturally, the answer to this question can be found by counting out the number of objects involved in three of those fourths. Slower pupils may have to resort to this type of computation, but more advanced members of the class will readily follow the discussion in the textbook. In like manner, pupils will complete more complicated problems, such as problem 5. Here the pupil will ask himself what $\frac{1}{4}$ of 76¢ is and then multiply by 3 to get $\frac{3}{4}$ of 76¢. The work on page 295 (especially ex. 10–15) should be completed without the use of pencil and paper. Some pupils may need to refer to tables of measures in order to recall equivalents when solving ex. 1–5.

Key: Page 294 **1.** 6 eggs; 9 eggs. **3.** $\frac{1}{4} \times 16$ oz. = 4 oz. **4.** 3×4 oz. = 12 oz. **5.** $\frac{3}{4} \times \$.76 = \$.57$. **6.** $\frac{1}{8} \times 16$ oz. = 2 oz. 3×2 oz. = 6 oz. **7.** $\frac{3}{8} \times \$.80 = \$.30$.

Page 295 **1.** 45, 40, 3. **2.** 27, 8, 8. **3.** 9, 24, 14. **4.** 10, 3300, 3. **5.** 6, 20, 1980. **6.** $\frac{3}{4} \times 12$ eggs = 9 eggs (Betty). $\frac{2}{3} \times 12$ eggs = 8 eggs (Andy). **7.** $\frac{3}{4} \times \$.60 = \$.45$; $\frac{2}{3} \times \$.60 = \$.40$. **8.** $\frac{3}{4} \times 32 = 24$. $24 \times \$.12 = \$2.88$. **9.** $\frac{7}{8} \times 8$ qt. = 7 qt. $7 \times \$.15 = \$1.05$. **10.** 3, 9, 15, 21. **11.** 7, 14, 21, 28. **12.** 3, 6, 12, 15. **13.** 9, 27, 12, 24. **14.** 3, 6, 12, 18. **15.** 15, 18, 12, 28.

Pages 296–304

Aim: To provide end-of-year review tests covering all major skill areas taught in Grade 4

Suggestions: Teachers will want to arrange time schedules so that these tests may be interspersed with oral activities. Some tests are designed to include both oral and written work. Such is the case with the test on page 296. Page 297 (addition test) is primarily a written test with the exceptions of ex. 1–3; page 298 (subtraction test) follows the same plan as the addition test; page 299 provides a change of pace by reviewing problem solving. Most of these are two-step problems. Page 300 (multiplication test) again provides oral work in ex. 1 and 2, and page 301 presents problems dealing with large trees. For children who have never been in "tall timber" country, these problems appear quite unrealistic. Pupils are helped in their comprehension of size by the comparison of some of these large trees with the taller office buildings they have seen. Or you might make some such statement as, "The General Sherman tree is over five times as high as the large tree in the playground." Some comprehension of the diameter of the General Sherman tree might be secured by comparing the base of the tree to the floor area of the school building or a large gymnasium. Many teachers use comparison situations such as these to secure fine pupil understanding. The pupils may be able to suggest the comparisons and do the necessary measuring. Also, some teachers make available pictures of these large redwood trees, and some pupils who have lived or visited in California will gladly report their reactions at seeing these great trees. Page 302 returns to testing basic skills with a division test (ex. 1–5 may be completed orally). Page 303 is an oral test on basic understandings dealing with measures, while page 304 is another problem test.

Key: Page 296 **1.** 4717, 895, 338, 4640, 29,841. **2.** 8253, 1559. **3.** 362, 904, 290 R7, 857, 429. **4.** 8171, 3464, 19,642, 6505. **5.** 11,850, 4000, 5276, 1799. **6.** 13, 9, 32, 6, 63, 15, 18, 6. **7.** 48, 8, 11, 9, 28, 16, 8, 49. **8.** 14, 35, 9, 17, 45, 8, 54, 12. **9.** 56, 9, 30, 54, 13, 8, 14, 8.

Page 297 **1.** (See the answers for page 7.) **2.** 47, 103, 85, 61, 54, 72, 28, 96; 48, 104, 86, 62, 55, 73, 29, 97; 58, 114, 96, 72, 65, 83, 39, 107. **3.** 78, 56, 44, 90, 35, 99, 67, 81; 79, 57, 45, 91, 36, 100, 68, 82; 89, 67, 55, 101, 46, 110, 78, 92. **4.** 260, 2691. **5.** 288, 2241. **6.** 265, 1000. **7.** 300, 2736. **8.** 327, 2220. **9.** 246. **10.** $115.85. **11.** 296. **12.** 2067, 3000, 2492, 1902, 3046, 1915. **13.** 1758, 2267, 1900, 1855, 1635, 1368.

Page 298 **1.** (See the answers for that page.) **2.** 63, 34, 41, 70, 15, 49, 82, 86; 59, 30, 37, 66, 11, 45, 78, 82; 58, 29, 36, 65, 10, 44, 77, 81. **3.** 67, 75, 90, 38, 56, 77, 21, 29; 63, 71, 86, 34, 52, 73, 17, 25; 62, 70, 85, 33, 51, 72, 16, 24. **4.** $23.50. **5.** $16.97. **6.** $15.24. **7.** $49.42. **8.** $31.68. **9.** $8.47. **10.** $15.80. **11.** $18.77. **12.** 1818. **13.** 2756. **14.** 3356, 497. **15.** 35, 2323. **16.** 337, 646, 42, 408, 2996, 2886. **17.** 194, 543, 272, 5876, 2735, 4379. **18.** 99, 159, 388, 639, 616, 995. **19.** 448, 156, 97, 477, 409, 6348.

Page 299 **1.** 25 min. **2.** 1 × 16 = 16 (bottles). **3.** 16 books + 11 books = 27 books. **4.** 27 × $.85 = $22.95. $22.95 + $.45 = $23.40. **5.** 88 + 87 + 91 + 91 + 93 = 450. 450 ÷ 5 = 90. **6.** 11 + 8 + 12 + 10 + 14 + 13 = 68. **7.** 3 × 12 spoons = 36 spoons. 36 − 3 = 33 spoons. **8.** 2 × $15.75 = $31.50.

Page 300 **1.** (See the answers for that page.) **2.** 120, 210, 300, 90, 110, 230, 400, 320; 240, 420, 600, 180, 220, 460, 800, 640; 360, 630, 900, 270, 330, 690, 1200, 960. **3.** $576.70, 67,600, $201.85. **4.** $627.64, 6016, $317.61. **5.** $215.46, 9792, $136.01. **6.** $569.16, 8360, $366.48. **7.** $116.85, 26,370, $153.08. **8.** $109.12, 11,394, $99.12. **9.** $120.78, 9441, $370.02. **10.** 15,184, 55,480, 48,472, 40,880. **11.** 3920. **12.** 5055. **13.** 2175, 7310, 7178, 1292, 3060, 2752. **14.** 5740, 1710, 2600, 8010, 4740, 3240. **15.** 53,816, 15,552, 17,603, 58,181, 14,500, 9792.

Page 301 **1.** 21 × 13 ft. = 273 ft.; yes. **2.** 102 ÷ 6 = 17 (ropes). **3.** 7 × 2000 lb. = 14,000 lb. **4.** 272 ft. − 267 ft. = 5 ft.; 108 ft. − 102 ft. = 6 ft. **5.** 364 ft. − 272 ft. = 92 ft.; 364 ft. − 267 ft. = 97 ft.

Page 302 **1.** (See the answers for that page.) **2.** 8 R1, 6 R2, 11 R3, 14 R3, 4 R3, 0 R3, 1 R2, 5 R2; 6 R3, 5 R1, 9 R2, 11 R4, 3 R4, 0 R3, 1 R1, 4 R2; 4 R5, 3 R5, 6 R5, 8 R3, 2 R5, 0 R3, 0 R6, 3 R1; 4 R1, 3 R2, 5 R7, 7 R3, 2 R3, 0 R3, 0 R6, 2 R6. **3.** 4 R1, 5 R1, 9 R3, 5 R3, 10 R1, 0 R2, 2 R1, 7 R3; 3 R2, 4 R1, 7 R4, 4 R3, 8 R1, 0 R2, 1 R4, 6 R1; 2 R3, 3, 5 R4, 3 R2, 5 R6, 0 R2, 1 R2, 4 R3; 2 R1, 2 R5, 4 R7, 2 R7, 5 R1, 0 R2, 1 R1, 3 R7. **4.** 93 R2. **5.** 904. **6.** 476, 612, 897 R1, 673. **7.** 358 R2, 784, 752, 819. **8.** 967 R1, 193, 258, 638. **9.** 749, 430 R1, 968 R1, 719. **10.** \$2.50. **11.** \$.85. **12.** 29, 93, 567, 403 R2, 276. **13.** 38, 62 R3, 897, 328, 560. **14.** 92, 47, 628, 908, 972. **15.** 15 R5, 35, 215 R3, 750 R7, 409. **16.** 73, 51 R4, 476, 609, 841.

Page 303 **1.** 1958. **2.** 50 qt. **3.** 5280 ft. **4.** 900 sec. **5.** 32 qt. **6.** 27 in. **7.** Aug. 31. **8.** 50 min. **9.** 12°. **10.** Thursday.

Page 304 **1.** Estimated, \$4.00; exact, \$4.95 − \$.98 = \$3.97. **2.** \$.75 + \$.60 + \$.90 + \$.60 + \$.75 = \$3.60. \$3.60 ÷ 5 = \$.72. **3.** 3 × \$.95 = \$2.85. \$5.00 − \$2.85 = \$2.15. **4.** \$1.00 + \$.75 + \$.40 = \$2.15; yes. **5.** Estimated, \$60.00; exact, 3 × \$19.75 = \$59.25. **6.** Estimated, \$5.00; exact, \$14.88 ÷ 3 = \$4.96. **7.** \$38.63 + \$53.50 + \$97.38 + \$11.66 = \$201.17. **8.** \$1.00 − \$.90 = \$.10. \$.10 ÷ \$.03 = 3 R1¢; 3 lollipops. **9.** \$.50 ÷ 2 = \$.25; \$.25 + \$.45 = \$.70. **10.** 408 pupils − 382 pupils = 26 pupils.

Page 305

Aim: To review the major aims of Chapter 8

Suggestion: The two major aims dealing with the addition of fractions are not reviewed or tested at this time. As was indicated in connection with the suggestion for page 281, the work on fractions is developed as preparation for Grade 5 and is therefore not tested here. However, the other major aims are reviewed as follows:

Chapter Review	*Aim Number*
Ex. 1, 2, 8–10, 13–14	4
Ex. 3–7; 11–12	6
Ex. 6, 7, 13	5
Ex. 12, 16	1

Key: **1.** 5, 10, 15, 25. **2.** 8, 16, 18, 21. **3.** 3627, 663, 2652, 1794, 975, 3471, 2886, 1950; 5766, 1054, 4216, 2852, 1550, 5518, 4588, 3100; 5301, 969, 3876, 2622, 1425, 5073, 4218, 2850; 930, 170, 680, 460, 250, 890, 740, 500. **4.** 528, 625, 463, 825 R3, 438. **5.** 560 R6, 706 R3, 384, 837, 975. **6.** 4 pk. **7.** 32 qt. **8.** 6 eggs; 9 eggs. **9.** $\frac{1}{2}$ in.; $\frac{3}{4}$ in. **10.** Neither; neither. **11.** \$27.00. **12.** 32¢. **13.** 45 lb. **14.** 12 oz. **15.** \$2.00. **16.** 188 mi.

Page 306

Aim: To present Problem Test 8

Key: **1.** \$.25 + \$.19 + \$.08 + \$.39 + \$.28 = \$1.19. **2.** \$32 ÷ 2 = \$16. $\frac{3}{4}$ × \$16 = \$12. **3.** \$3.12 ÷ 8 = \$.39. 15 × \$.39 = \$5.85. **4.** \$34.00 − \$29.95 = \$4.05. **5.** 86 + 89 + 93 + 92 = 360. 360 ÷ 4 = 90. **6.** 52 × \$.65 = \$33.80. **7.** \$37.95 − \$15.00 = \$22.95. \$22.95 ÷ 3 = \$7.65. **8.** 144 ÷ 8 = 18 (groups); no. **9.** 24 × \$.19 = \$4.56. \$5.00 − \$4.56 = \$.44; 1 quarter, 1 dime, 1 nickel, 4 pennies. **10.** 49 da. − 35 da. = 14 da. 14 ÷ 7 = 2 wk.

Page 307

Aim: To provide a diagnostic test with reference to practice pages

Key: **1.** 1619, 3068, 2428, 2480. **2.** 1588, 4080, 2233, 562. **3.** 18,445, 29,792, 10,114, 39,931. **4.** 25,542, 15,525, 18,470, 48,426. **5.** 279, 762, 198 R2, 583 R1. **6.** 190 R3, 703, 608 R3, 450. **7.** $\frac{3}{4}$, $\frac{4}{4}$ or 1, $\frac{7}{8}$. **8.** 4, 28, 20.

Page 308

Aim: To provide a cumulative end-of-year test

Key: **1.** (See the answers for those pages.) **2.** 4314. **3.** 4366. **4.** \$68.95. **5.** \$13.43. **6.** \$45.40. **7.** 1754. **8.** 17,983. **9.** 16,392. **10.** \$4.75. **11.** 803. **12.** 690 R5. **13.** 7 bu. **14.** 9 eggs. **15.** 117. **16.** 4 wk. 3 da. **17.** 6 × \$7.50 = \$45.00. \$45.00 − \$5.25 = \$39.75. **18.** \$.35.

Pages 309–312

Aim: To provide a ready reference of the basic addition, subtraction, multiplication, and division facts

Suggestion: The facts are listed on these pages in sequential order so that pupils may see the relationships which exist between these facts. Be sure to point out the relationships.

Pages 313–326

Aim: To provide "More Practice" pages

Suggestion: These pages are correlated with certain pages throughout the text. At the bottom of many of the text pages you will find a red circle with a white number that refers to a section of these practice pages.

Key: Page 313 **1.** 14, 16, 10, 13. **2.** 12, 6, 18, 9. **3.** 12, 8, 10, 15. **4.** 11, 13, 10, 15. **5.** 15, 9, 12, 14. **6.** 11, 12, 14, 16. **7.** 14, 10, 6, 11. **8.** 11, 8, 8, 9. **9.** 11, 14, 11, 10. **10.** 7, 10, 8, 6. **11.** 12, 13, 9, 17. **12.** 1, 6, 5, 9. **13.** 6, 5, 9, 4. **14.** 4, 4, 6, 8. **15.** 2, 9, 5, 7. **16.** 3, 4, 1, 2. **17.** 0, 9, 5, 7. **18.** 4, 6, 8, 9. **19.** 4, 8, 5, 2. **20.** 2, 6, 7, 9. **21.** 2, 9, 8, 3. **22.** 7, 8, 9, 8.

Page 314 **1.** 136, 87, 169, 104, 535, 676, 322. **2.** 108, 68, 87, 126, 757, 999, 998. **3.** 68, 99, 79, 144, 878, 945, 875. **4.** 9, 19, 29, 39. **5.** 9, 49, 79, 99. **6.** 9, 29, 49, 59. **7.** 13, 23, 33, 43. **8.** 10, 40, 60, 90. **9.** 11, 21, 41, 81. **10.** 18, 38, 58, 68. **11.** 12, 22, 42, 92. **12.** 12, 42, 62, 72. **13.** 22, 22, 20, 15, 16, 18, 16, 18, 23. **14.** 19, 23, 22, 23, 22, 21, 26, 21, 24.

Page 315 **1.** 58, 131, 152, 148, 663, 767, 504. **2.** 69, 89, 91, 87, 980, 971, 911. **3.** 131, 109, 94, 134, 720, 823, 416. **4.** 101, 95, 60, 166, 875, 592, 757. **5.** 138, 112, 404. **6.** 149, 156, 925. **7.** 96, 1716. **8.** 157, 1006. **9.** 200, 1000. **10.** 197, 891. **11.** 195, 1434. **12.** 201, 1022. **13.** 58, 40, 14, 10, 208, 453, 44. **14.** 40, 71, 26, 6, 220, 132, 37. **15.** 24, 4, 11, 11, 93, 434, 90.

Page 316 **1.** 15, 27, 36, 8, 567, 609, 445. **2.** 6, 9, 35, 14, 103, 349, 466. **3.** 58, 29, 19, 27, 333, 512, 306. **4.** 615, 92, 78, 729, 674, 588. **5.** 343, 228, 46, 522, 58, 360. **6.** 256, 188, 72, 15, 683, 198. **7.** 73, 276, 395, 91, 539, 63. **8.** 64, 128, 102, 88, 286, 864, 1426. **9.** 183, 159, 216, 249, 1233, 690, 396. **10.** 186, 120, 273, 148, 408, 306, 963.

Page 317 **1.** 344, 382, 562, 920, 702, 360. **2.** 788, 910, 506, 366, 960, 726. **3.** 750, 489, 780, 576, 605, 540. **4.** 813, 720, 849, 920, 459, 847. **5.** 224, 388, 192, 292, 492, 2240, 3564. **6.** 140, 240, 116, 348, 1804, 1124, 1880. **7.** 84, 372, 147, 120, 1296, 846, 528. **8.** 8999, 8987, 7879, 8968, 8997. **9.** 9787, 9568, 6619, 7989, 8836. **10.** 9846, 8249, 7470, 8402, 7496.

Page 318 **1.** 14, 26, 18, 26, 24, 15. **2.** 25, 16, 18, 16, 19, 19. **3.** 17, 28, 38, 15, 45, 22. **4.** 23, 15, 36, 17, 13, 24. **5.** 68 R1, 84 R2, 47 R2, 45 R3, 96 R1. **6.** 89 R2, 67 R1, 82 R3, 53 R1, 95 R2. **7.** 53 R3, 95 R2, 64 R1, 58 R1, 69 R2. **8.** 38 R1, 29 R2, 85 R1, 74 R1, 76 R1. **9.** 38 R3, 94 R1, 47 R1, 37 R2, 79 R1. **10.** 98 R1, 43 R3, 78 R2, 59 R2, 78 R1. **11.** \$1.21, \$1.36, \$1.71, \$1.54, \$9.62, \$9.25. **12.** \$.83, \$1.81, \$1.42, \$1.02, \$13.23, \$11.09. **13.** \$1.54, \$1.50, \$1.48, \$1.05, \$9.66, \$11.16.

Page 319 **1.** 94, 6968. **2.** 136, 8901. **3.** 209, 9878. **4.** 232, 8579. **5.** 1352, 555, 3218. **6.** 2089, 474, 2008. **7.** 1266, 643, 2645. **8.** 3773, 2456, 1199. **9.** 86, 45, 92 R2, 74, 53 R4. **10.** 67, 23 R2, 72, 36 R3, 49. **11.** 32 R4, 98, 58 R1, 76, 89. **12.** 199, 9175. **13.** 165, 6972. **14.** 17, 94, 168, 365, 5571, 828. **15.** 815, 718, 2450, 1104, 1524. **16.** 96 R2, 58, 65 R3, 86. **17.** 39, 76 R1, 87, 27.

Page 320 **1.** 1548, 2104, 640, 1974, 876, 3750. **2.** 1044, 1620, 489, 1162, 2700, 4818. **3.** 3310, 848, 684, 642, 4356, 5880. **4.** 1442, 822, 932, 2070, 1014, 2340. **5.** \$1.45, \$4.64 R1¢, \$5.93, \$8.36, \$3.48 R4¢. **6.** \$2.96, \$3.53, \$5.93, \$9.15, \$2.18 R2¢. **7.** \$1.58 R2¢, \$7.98 R1¢, \$5.47, \$6.87, \$4.69 R5¢. **8.** \$1.14, \$7.25, \$3.68 R3¢, \$9.71 R4¢, \$6.82. **9.** 27, 32. **10.** 24, 26. **11.** 29, 33. **12.** 29, 30. **13.** 42, 128, 219, 1110, 3209, 798. **14.** 492, 283, 243, 267, 3047, 46.

Page 321 **1.** \$84.47, \$66.28, \$74.52, \$110.39, \$118.72. **2.** \$45.05, \$110.00, \$45.85, \$120.37, \$180.59. **3.** 32, 31. **4.** 32, 31. **5.** 34, 30. **6.** 24, 29. **7.** 1997, 3979, 2686, 4367, 5856, 759. **8.** 4989, 885, 2776, 3468, 1534, 1912. **9.** 1025, 3962, 257, 2814, 948, 6733. **10.** 17, 8, 36, 9, 25. **11.** 5, 6, 13, 9, 15. **12.** 56, 6, 48, 9, 63. **13.** 10, 9, 11, 9, 3.

Page 322 **1.** 920, 960, 950, 900. **2.** 740, 960, 980, 1800. **3.** 1360, 990, 3600, 720. **4.** 2700, 1400, 4320, 2500. **5.** 552, 336, 216, 450. **6.** 204, 1056, 759, 1024. **7.** 510, 814, 429, 560. **8.** 256, 238, 528, 195. **9.** 1690, 3363, 5694, 2592. **10.** 1494, 2795, 2128, 6142. **11.** 3515, 8366, 5550, 874. **12.** 4140, 4018, 5518, 2961. **13.** 52, 3276, 101, 29. **14.** 39, 51 R1, 50, 170. **15.** 2736, 17, 1170, 89.

16. 165, 188, 167, 2296. **17.** 247, 79, 27, 134. **18.** 127 R3, 935, 123, 35. **19.** 73, 154, 3705, 115.

Page 323 **1.** 504, 1380, 317, 296. **2.** 1036, 375, 745, 978 R1. **3.** 1175, 3196, 273 R6, 458 R1. **4.** 630, 1701, 317 R2, 482. **5.** 1581, 760, 756, 735. **6.** 155, 220, 206, 207, 290, 266, 340, 254. **7.** 931, 1979, 1416, 182, 3725. **8.** 13,760; 12,250; $430.64. **9.** 29,250; 26,144; $171.14. **10.** 17,057; 3021; $177.55. **11.** 11,426; 21,996; $374.88. **12.** 29,463; 26,208; $789.09. **13.** 19,251; 56,334; $128.00. **14.** 50,799; 10,640; $286.40. **15.** 8680; 21,624; $427.20. **16.** 24,582; 13,616; $371.05. **17.** 54,498; 34,216; $86.10. **18.** 36,135; 65,160; $71.28.

Page 324 **1.** 5283, 1799, 2660, 1850, 9769. **2.** 1775, 2000. **3.** 365 R1, 873, 726, 695. **4.** 1880; 29,232; 6000; 797; 9828. **5.** $8.75, 94, $3.24. **6.** $18.60, 56, $3.48. **7.** $12.84, 66, $2.45. **8.** 6944; 19,542; 8196; $218.79; $87.50. **9.** 9861; 33,471; 58,422; $150.00; $125.45. **10.** 14,679; 21,552; 18,352; $119.04; $63.40. **11.** 4695; 45,684; 8840; $306.25; $254.24. **12.** 7836; 19,820; 20,000; $282.00; $385.65. **13.** 16,548; 15,128; 10,854; $130.50; $162.80.

Page 325 **1.** 42. **2.** 78. **3.** 495. **4.** 48. **5.** 162. **6.** 417. **7.** 57. **8.** 192. **9.** 768. **10.** 12,696; 59,422; 673 R4. **11.** 19,276; 17,738; 981. **12.** 45,423; 45,480; 704 R3. **13.** 27,790; 15,254; 310 R5. **14.** 15,894; 14,202; 819. **15.** 35,225; 7362; 507.

Page 326 **1.** 303, 2337. **2.** 300, 1248. **3.** 274, 1567. **4.** 345, 1569. **5.** 338, 900. **6.** 218, 3738, 1815. **7.** 295, 1988, 359. **8.** 350, 3327, 1099. **9.** 544, 26, 631. **10.** 39, 69, 16. **11.** 23, 40, 35. **12.** 23, 19, 61. **13.** 53, 55, 85. **14.** 30, 50, 34. **15.** 69, 75, 55. **16.** 6, 4, 4, 5. **17.** 7, 5, 8, 4. **18.** 32, 6, 15, 35. **19.** 21, 18, 14, 15. **20.** 49, 10, 54, 10.

Remedial Work on the Addition Facts

Number Relationships. One of the outstanding features of the *American Arithmetics* is the use of number relationships and fundamental principles in the teaching of the basic number facts and many of the other topics in arithmetic. These principles and relationships greatly simplify learning and help the pupils to attain a degree of mastery and accomplishment that is impossible by the older methods. The importance of number relationships as used in this series of books is stated on pages 4 and 5 of this Guide; now is the time to reread this statement since it will help to orient you with respect to the following work.

In the fourth grade there are always some pupils who have not yet mastered all of the harder addition facts. To remedy this situation, reteaching of these harder facts by the aid of the number relationships described below is often necessary.

Commutative Principle. The most generally useful number relationship that applies to the addition facts is the *commutative principle,* which is explained on page 8 of *American Arithmetic, Grade 4.* This principle shows that the sum of two numbers is the same regardless of the order in which they are added; that is, 4 and 9 have the same sum as 9 and 4. This principle enables a pupil to help himself if he forgets the answer to an addition fact. For example, if he does not recall the sum of 4 and 9, he interchanges the numbers to 9 and 4 and then tries to give their sum. He probably recalls that 9 and 4 are 13; therefore, 4 and 9 are 13. In remedial work, one of the first things for you to do if a pupil forgets the answer to an addition fact is to ask him to interchange the numbers and try again. In addition to its use in remedial work, the commutative principle is constantly used in the original learning of the addition facts, each new fact and its reverse being taught at the same time. This means that facts like $8 + 7 = 15$ and $7 + 8 = 15$ are taught together. By teaching two facts together in this way the task of learning the addition facts is reduced almost by half.

The Doubles. Every experienced teacher is familiar with the fact that children learn with great facility the doubles, such as 6 and 6, 7 and 7, 8 and 8, 9 and 9. Once these doubles are learned, they are not easily forgotten. The doubles have additional importance because a group of new addition facts, known as the *near doubles*, can be easily learned by relating them to the doubles. In other words, the doubles serve as helpers in learning the near doubles.

The Near Doubles. A combination like 5 and 6 is called a *near double* because it is nearly like 5 and 5. Another *near double* is 6 and 7 because it is nearly like 6 and 6. In a double like 6 and 6, both numbers are alike. In a near double like 6 and 7, one number is 1 more than the other. It is an easy matter for the pupil to use his knowledge of the doubles to enable him to learn the near doubles. For example, since he knows that 5 and 5 are 10, he easily sees that 5 and 6 are 11. Similarly, since he knows that 6 and 6 are 12, he easily sees that 6 and 7 are 13. The relationship between a double and its near double should first be illustrated by objects. Start with objects representing 5 and 5 and show that the sum is 10. Then add 1 to one of the 5's, making 5 and 6, and show that the sum is 1 larger than 10, or 11. Repeat this illustration with objects representing 6 and 6 and show that if one of the 6's is increased by 1, the sum is also increased by 1. When addition facts like $6 + 7 = 13$ or $7 + 8 = 15$ are learned by the older methods, they are regarded as difficult facts; but they become relatively easy if each is learned by relating it to its corresponding double.

In practice and drill exercises, if a pupil forgets the answer to a near double like 7 and 8, ask him, "How many are 7 and 7?" Then ask, "How many are 7 and 8?" When he learns that 7 and 8 are 15, he also knows, by the commutative principle, that 8 and 7 are 15.

There are 8 near doubles with sums above 10, as follows: $5 + 6 = 11$, $6 + 7 = 13$, $7 + 8 = 15$, and $8 + 9 = 17$, together with their reverses $6 + 5 = 11$, $7 + 6 = 13$, $8 + 7 = 15$, and $9 + 8 = 17$.

Adding 9. There are 12 addition facts, with sums above 10, each with 9 as one of the addends. These facts are $9 + 2 = 11$, $9 + 3 = 12$, $9 + 4 = 13$, $9 + 5 = 14$, $9 + 6 = 15$, $9 + 7 = 16$, and their reverses. $9 + 8 = 17$ is omitted from this group since it is included in the near doubles; likewise $9 + 9 = 18$ is omitted because it is included in the doubles. These 12 facts are easily taught by number relationships, as follows: by grouping objects, show that $9 + 7$ is the same as $10 + 6$, or 16. By taking 1 from the 7 and putting it with the 9 to make 10, $9 + 7$ becomes $10 + 6$, or 16. In like manner, show that $9 + 6$ is the same as $10 + 5$, or 15; hence $9 + 6 = 15$. After this relationship is explained objectively, the pupil easily sees that adding 9 to another number is the same as taking 1 from the other number and adding 10 to the result. He soon finds that he can change $9 + 6$ to $10 + 5$ mentally, without the use of objects. The process of thinking is then abridged as follows: To find the sum of 9 and 6, look at the 6 and think "5"; then say "15."

Adding 8. There are 8 facts which have 8 as one of the addends. These facts are $8 + 3 = 11$, $8 + 4 = 12$, $8 + 5 = 13$, and $8 + 6 = 14$, and their reverses. $8 + 7 = 15$ is included in the near doubles; $8 + 8$ is one of the doubles. By using objects, show that $8 + 6$ is the same as $10 + 4$. By taking 2 from the 6, and putting it with the 8 to make 10, $8 + 6$ becomes $10 + 4$, or 14. Similarly, $8 + 5$ becomes $10 + 3$, or 13. This procedure explained objectively can soon be carried on mentally, as follows: To find the sum of 8 and 5, take 2 from 5 and think "3"; then say "13."

By using the relationships described above, most of the harder addition facts, with sums above 10, are easily learned. It should be emphasized that these relationships are to be used only in developing the correct response to an addition fact that has been forgotten, or that is given with hesitation. If the pupil is asked to give the sum of 7 and 8, he should not be required to relate it to 7 and 7 if he already remembers that $7 + 8 = 15$. The final aim should be the automatic response "15." When that is obtained, there is no further need of a number relationship as an aid toward finding the sum.

For further information on the use of number relationships as an aid to learning the harder addition facts, see Chapter 2 of Upton-Fuller, *American Arithmetic, Grade 3* and the *Teacher's Guide and Key* for *American Arithmetic, Grade 3*.

Subtraction Facts. The subtraction facts can also be easily learned by the aid of number relationships. In this case, each subtraction fact is related to its corresponding addition fact, as explained on page 16 of *American Arithmetic, Grade 4*.

Audio-Visual Aids

Films: The following films are 16 mm. motion pictures and are listed alphabetically by producer's or distributor's name. A request will usually bring information concerning the objectives of the film, its cost, and its nearest point of distribution.

Coronet Films, Coronet Building, 65 East South Water Street, Chicago 1, Illinois.

Addition Is Easy
Subtraction Is Easy
Multiplication Is Easy
Division Is Easy
Let's Count
What Time Is It?
We Discover Fractions
The Calendar
Story of Our Number System, The

Encyclopaedia Britannica Films, Inc., 1150 Wilmette Avenue, Wilmette, Illinois.

The Number System
Meaning of Plus and Minus
Weights and Measures
What Are Fractions?

Teaching Film Custodians, Inc., 25 West 43 Street, New York 36, New York.

Borrowing in Subtraction

Wayne University, Audio-Visual Materials Bureau, 438 W. Ferry Street, Detroit 2, Michigan.

(For teachers only)
Helping Children Discover Arithmetic

Text-Film Department, McGraw-Hill Book Company, 330 West 42 Street, New York 36, New York.

What Is Four?
Teen Numbers
Parts of Things
Parts of Nine

Filmstrips: Before ordering these filmstrips, teachers are urged to communicate directly with the producer or distributor listed below. The sales information you will receive will assist you in determining the effectiveness of these filmstrips for your particular classroom.

Eye Gate House, Inc., 146-01 Archer Avenue, Jamaica, New York.

Bridging the Decades (9 titles)
Work and Play with Numbers (8 titles)

Text-Film Department, McGraw-Hill Book Company, 330 West 42 Street, New York 36, New York.

Primary Arithmetic Series
  Number Family in Addition
  The Three's
  Two's in Division
  What Numbers Mean
  Zero as a Placeholder
  Compound Subtraction
Adventures with Numbers
  Making Change
  Zero in Multiplication
How To Tell Time
  Part I — Hour and Half Hour
  Part II — The Minutes
History of Our Calendar
History of Our Number System
History of Telling Time

Society for Visual Education, Inc., 1345 Diversey Parkway, Chicago 14, Illinois.
Basic Numbers Speed-O-Strip Series
- Number Recognition
- Addition Combinations
- Subtraction Combinations
- Multiplication Combinations
- Division Combinations

Fraction Series

Flash Cards:

Bulletin Board Charts on Arithmetic — F. A. Owen Publishing Company, Dansville, New York — a set of twenty-one charts which can be purchased singly. Topics range from Roman numerals to long division.

Domino Cards — J. L. Hammett Company, Kendall Square, Cambridge 42, Massachusetts.

Graded Difficulty Number Cards — Iroquois Publishing Company, (Charles E. Merrill Books), 1300 Alum Creek Drive, Columbus 16, Ohio — four boxes of flash cards, one dealing with primary addition cards, another with subtraction, a third with multiplication, and a fourth with division. They are made of durable material and are large enough for classroom use.

Arithmetic Readiness Cards — Scott, Foresman and Co., 433 East Erie Street, Chicago 11, Illinois. Set 1 deals with recognition of numbers 1 through 10; set 2 deals with numbers from 10 through 99.

Devices: Numerous companies specializing in devices will send their catalogues upon request. Some of these are:

Milton Bradley Company, 74 Park Street, Springfield 2, Massachusetts
J. L. Hammett Company, Kendall Square, Cambridge 42, Massachusetts
The Judy Company, 310 North Second Street, Minneapolis 1, Minnesota
Holt, Rinehart and Winston, 383 Madison Avenue, New York 17, New York

Games: Many games are associated with arithmetic. Only a few are listed below:

Arith-O-Cards — Arith-O-Card Company, 157 South Mentor Avenue, Pasadena 5, California — a rummy game with addition and multiplication cards.

Fracti-Fax — The Plaway Games, C. N. McRae, Unadilla, New York — 45 cards with fractions.

Hit — The Plaway Games — Beano-like game.

Parking Lot Game — Ideal School Supply Company, 8316 S. Birkhoff Avenue, Chicago 20, Illinois — practice on multiplication facts.

Round-Up Game — Ideal School Supply Company — practice on division facts.

Remedial-Special Instructional:

Ready Arithmetic Review — Dana and Company, Box 201, Barrington, Rhode Island — a series of 40 self-correcting arithmetic exercise cards which have been scientifically developed. A Teacher's Manual explains the use of the cards, and grouping of pupils is facilitated by using *Ready Arithmetic Review.*

Learning Laboratories: The Learning Center, Inc., 53 Bank Street, Princeton, New Jersey, has developed several learning laboratories that can be used with *American Arithmetic, Grade 4.* These laboratories are available in class-size sets, so that each pupil can learn with his own three-dimensional materials at his own desk. With many of the laboratory sets listed below, The Learning Center supplies demonstration models and supplementary materials for the teacher. A Teacher's Manual accompanies each set of laboratories. Discovery sheets are provided for individual use by pupils.

K101 — *Counting Frame* (Chap. 1, 3)
K102 — *Pattern Boards* (Chap. 1)
K103 — *Additive Sticks* (Chap. 1)
K104 — *Ten Tens Board* (Chap. 1, 4, 5)
K105 — *Number Line* (Chap. 1–5)
K106 — *Colored Rods* (Chap. 1)
K107 — *Time Learning* (Chap. 1, 5)
K108 — *Ones, Tens, Hundreds* (Chap. 1)
K109 — *Oriental Abacus* (Chap. 5)
K111 — *Cardinality with Magnetic Board* (Chap. 1–5)
K112 — *Base and Place* (Chap. 1)
K115 — *Simple Fractions* (Chap. 1–8)
K117 — *Advanced Fractions* (Chap. 3–8)
K118 — *Fractional Equivalents* (Chap. 3–8)
K120 — *Linear Measurement* (Chap. 5)
K140 — *Geometry* (Chap. 7)

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